DECEMBER
1961

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WITH ELECTRICAL CONTRACTING

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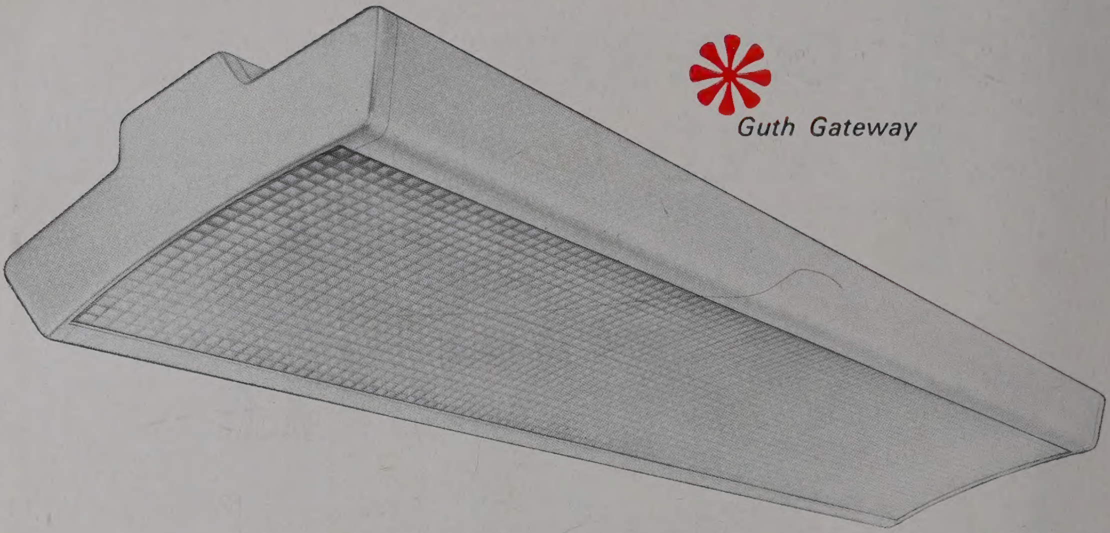


Guth Gateway

Sure it looks good, but why specify it?

Gateway's intrinsic beauty is obvious. But that's only half the story. Here is the other half — engineering and construction features that make Gateway worthy of your specification. Gateway is *not* a wrap-a-round. The concave bottom actually hinges separately from the rugged 20-gauge steel ends. Simplifies relamping considerably — one strong panel, not an unwieldy basket, to hinge down.

The steel ends won't warp; also they add extra rigidity to the fixture in continuous-row mountings, or as individual units. (No glue or piano wire holding it together.) The 4′ or 8′, one-piece *tubular* plastic side wings with capped ends (minimize dust and dirt from holding conventions therein) offer greater strength and lower side-brightnesses.

The *concave* Gratelite* bottoms (choice of Prismoid** or Standard Gratelite) are solidly molded with built-in ultra-violet resistant additives. Both Gratelites feature ⅜″ open cubicles — dust and dirt filter thru — doesn't mar beauty.

All the steel parts, including the channel, are formed from electrolytic, *zinc-coated* and phosphatized steel. There's hardly any chance of their rusting regardless of humidity or climate. Each steel part is finished in the new super hard, super efficient *Acrylic* enamel. This is the finish automakers use, and say "never needs polishing". Paint people tell us "it most closely approaches the physical properties of porcelain enamel"

Of course, each unit includes a CBM/ETL Ballast, plus — we heat test Gateways to insure that ballast-case operating temperatures will not exceed 90°C in a 75°F room ambient temperature. (Add these last 13 words to every specification and watch competitors back away!)

Gateway is available in *2, 3 or 4 lamps* — in the same "full-width" fixture — not a corridor looking unit in a carload.

For the final test, write us on your letterhead. We'll have our salesman show you a "live" demonstration of Gateway. If you just don't like salesmen, write us and we'll send our Gateway Brochure. In either case, you'll like Gateway, a fixture that proves itself.

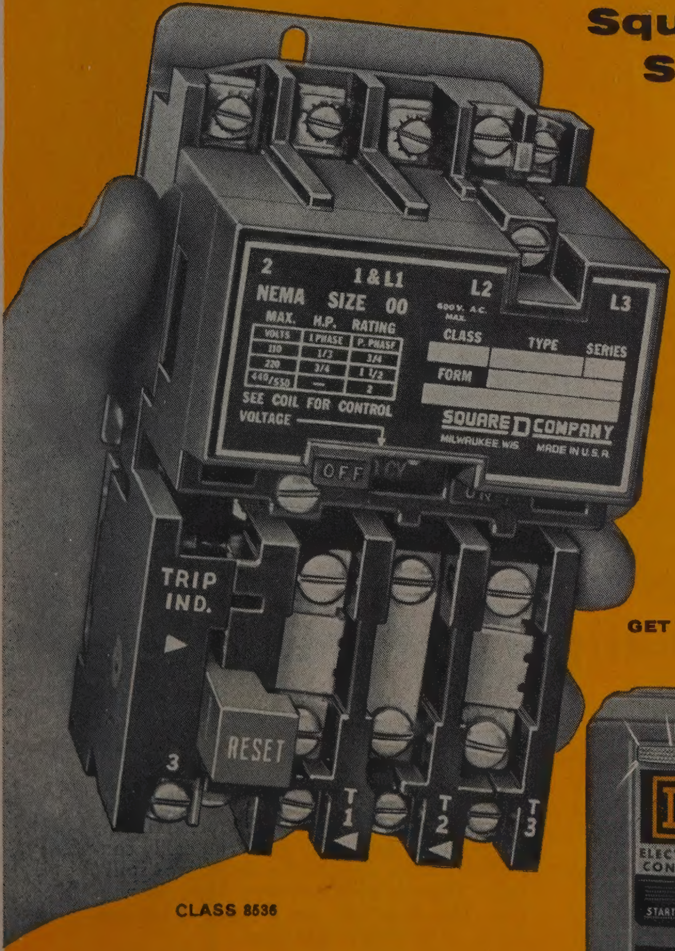
Guth
LIGHTING
since 1902

THE EDWIN F. GUTH CO., 2615 WASHINGTON BLVD., BOX 7079, ST. LOUIS 77, MO.

* ® U.S. PAT. NO. 2,745,001 — CAN. PAT. 1957, NO. 538,245 — ** ® U.S. PAT. NO. 2,904,673

NEW SMALL MAGNETIC STARTER COSTS LESS, SAVES SPACE ON LOW-HORSEPOWER JOBS!

Square D NEMA Size 00 Starter Rated ¾ to 2 Hp for 3-Phase Service



CLASS 8536

• You no longer need to buy more starter capacity than you can use for low-horsepower jobs! This new Square D Size 00 starter is compact, easy to install, simple to use and maintain—and it costs 18% less than the Size 0 starter you formerly had to specify to get the advantages of magnetic control! With no sacrifice in quality, this new starter provides: straight-through wiring—pressure-type terminals—1-piece overload relays for complete motor protection—pushbutton or selector switch optional in the cover. Also available without overload relays.

GET THE COMPLETE STORY! Write for Bulletin SM-297. Square D Company, 4041 North Richards St., Milwaukee 12, Wisconsin.

New starter available either open or in NEMA Type 1 enclosure. Enclosure shown with pilot light and start-stop push button in cover. Pilot light or push button available in kit form for easy field installation.

SQUARE D COMPANY

wherever electricity is distributed and controlled

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Intenso®

Pat. Pend. U. S. A.
Pat. Pend. Canada

"Quartzlite 1500"

finest floodlight in the industry!

Appleton-Engineered for Amazing Efficiency!

Here's high floodlight operating efficiency PLUS real floodlight lumen output! To utilize the remarkable new 1500-Watt Quartz-Iodine Lamp to the fullest possible extent, Appleton has designed and developed this sensational new fixture.

For a host of hard-to-light situations, the Appleton Intenso Quartzlite 1500 floodlight complements the new, more powerful filament type lamp with truly compact design. Light in weight, easy to install, easy to handle, this floodlight will do a more efficient job than a comparable conventional floodlight.

The 22 lumens per watt throughout life of the Quartzlite 1500-watt lamp represents 50% greater light than that of a 1500-watt PS52 lamp. It gives a full 22 lumens per watt constantly through a 2000 hour life.

The Quartzlite 1500 offers an unusually efficient beam pattern. Its beam spread in the vertical plane has a very sharp and easily controlled cutoff, eliminating excessive "spill" light. There is wide horizontal light distribution. This floodlight can be used either outdoors, or in most indoor areas.

Contact your Appleton Field Engineer, Franchised Distributor, or write today for Bulletin QL 15-161

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1701 Wellington Avenue, Chicago 13, Illinois

ELECTRICAL
CONSTRUCTION
AND MAINTENANCE

with which is consolidated Electrical Contracting The Electragist and Electrical Record Established 1901

Published for electrical contractors, electrical departments in industry, engineers consultants, inspectors and motor shops. Covering engineering, installation, repair, maintenance and management in the field of electrical construction and maintenance.

61ST YEAR • DECEMBER 1961

Sidelights 7

Washington Report 9

Heat is the Key, *An Editorial* 77

Electric Heat for Midwest Motel 79
By AUGUST ECKEL—Electric heat for a Midwest motel cut construction costs about $50,000; boosted annual income by adding three rental units; more than doubled amount of original electrical contract.

New Light Sources 83
By B. C. COOPER—Recently announced light sources contain many new advanced features, and provide important new tools and techniques for advanced lighting design practice. Some of these new lamps are described and discussed.

Closed-Circuit TV Safeguards Apartment Tenants 89
By J. H. WATT—A new Brooklyn apartment building features TV monitors in each apartment, enabling tenants to identify visitors at front and rear entrances of the building.

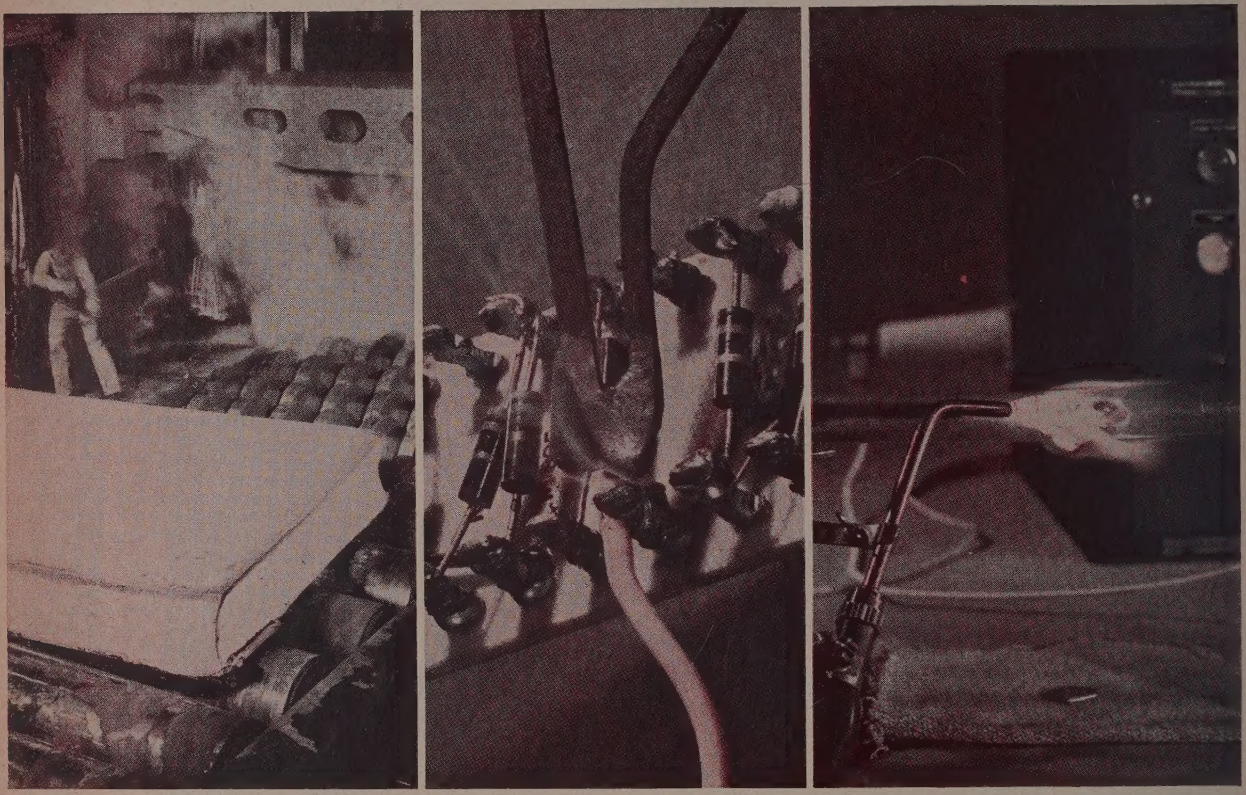
Estimating Forum—XVI 92
By RAY ASHLEY—Architect-contractor relations.

Tested Maintenance Procedures 94
By SVANTE EIKREM—Evolution of a successful industrial maintenance program requires appraisal of facilities and objectives, tempering theory with experience. Here are some practical comments concerning tested inspection routines and motor lubrication, cost evaluation and paper work, plus in-plant responsibility vs outside contracts.

MORE

SILICONE NEWS from Dow Corning

Scorching heat...



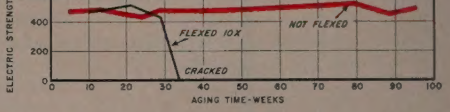
but still Silastic® insulation provides dielectric integrity

"Hot as the hinges of Hades" is a good way to describe the ambient temperature in a rolling mill. Now add plenty of moisture, salt for cleaning the mill bed, dripping grease, hot scale and glowing plates of steel. The result is double trouble for insulation on exposed motor feeder cables. Yet, cable insulated with Silastic, the Dow Corning silicone rubber, has provided the world's largest rolling mill trouble-free service since 1955.

Hotter than melted solder, but Silastic insulation still stays on the job without softening or cracking. That's why Silastic insulated hookup wire speeds production, is easy to use, results in fewer opens and shorts on completed jobs.

Fire will burn Silastic insulation, but leaves behind a non-conductive ash which continues to insulate as long as it stays in place and remains dry. This is why you find Silastic specified as the control wire insulation in critical military and commercial installations in which communications must not be interrupted by fire damage.

Leading manufacturers offer power cable, control cable, hookup wire, fixture and building wire with insulation of Silastic. Why not investigate, now?



Silastic insulation retains dielectric strength over a wide temperature span. What's more, its electrical properties are extremely stable and survive relatively unchanged even after long storage, weathering, thermal aging or heat cycling.

Write Dow Corning Corporation, Midland, Michigan, Dept. 3624 for detailed information and list of suppliers offering Silastic insulation on wire and cable.

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ELECTRICAL CONSTRUCTION AND MAINTENANCE

DECEMBER • 1961 *continued*

Warehouse—Office Conversion 98
Modernization of 30-year-old storage depot and ice plant for commercial use involved installation of new transformer, distribution switchgear, busduct, feeders, lighting and air conditioning.

Pool Lighting at 120 Volts 100
By W. P. TAYLOR and R. J. ARTHUR, SR.—A detailed report of an investigation to determine the causes of and possible remedies for electric shock in swimming pools with submerged 120-volt lighting.

Practical Methods 105
Colored conduit used in hot strip mill; laboratory evaluates luminous ceilings; removable panels for total floor access.

Reader Service 111
Product news announcements; catalogs and bulletins.

Reader's Quiz 137
Questions and answers on grounding portable filter motors; pushbutton station outdoors; underground conduit wiring.

Questions on the Code 143
Answers to code questions on conductor ratings; heating cable; buildings under single management disconnects.

In the News 151

Dates Ahead 159

Among the Manufacturers 160

Vol. 61, No. 12 ELECTRICAL CONSTRUCTION and MAINTENANCE DECEMBER 1961

Published monthly with an additional issue in September by McGraw-Hill Publishing Company, Inc. James H. McGraw (1860-1948), Founder. Executive, Editorial, Circulation and Advertising Offices: **McGraw-Hill Building, 330 W. 42nd St., New York 36, N.Y.** Printed in Albany, N.Y. **Officers of the Publications Division:** Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator, Daniel F. Crowley, Vice President and Controller. **Officers of the Corporation:** Donald C. McGraw, President; Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Executive Vice President and Treasurer; John J. Cooke, Vice President and Secretary.

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United States subscription rate for individuals in the field of the publication $3.00 per year. This issue 75 cents. Electrical Products Guide $2.50. Canada $5.00 a year. All other countries, $15.00 a year, payable in advance. Second class postage paid at Albany, N. Y., and at additional mailing offices. Printed in U.S.A. Title registered in U.S. Patent Office.
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Sidelights

ELECTRIC MOTEL

The new Holiday Inn near Chicago, Ill., is another large motel which offers its guests the luxury and convenience of electric heat and air conditioning, with important economies in operation and administration to the management. All-electric Holiday Inn was originally planned for central fuel-fired heating, but electrical contractors Brown Electric Service of Chicago teamed up with utility and manufacturers' representatives to prove to the owners that total-electric design was a "natural" for motel operation. Associate Editor August Eckel describes the installation in "Electric Heat for Midwest Motel" beginning on page 79.

NEW LIGHT SOURCES

A number of lamp designs have been brought out by lamp manufacturers in recent months. They provide new tools that can contribute wider scope to the whole field of lighting application. Associate Editor Berlon C. Cooper presents a round-up and discussion of these new lamps in "New Light Sources" beginning on page 83.

TV GUARDS APARTMENT TENANTS

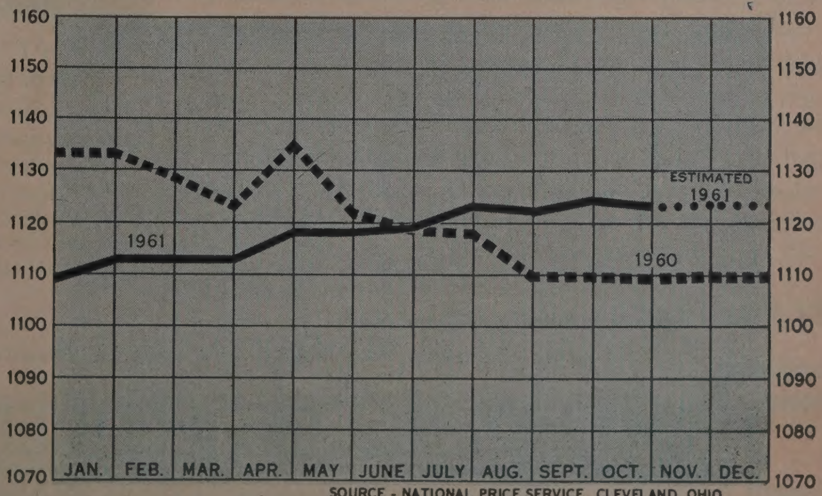
Tenants of the 112-unit Duplee Apartments in Brooklyn, N. Y., can check on callers visually before answering their call or letting them into the building. The new system, considered an important break-through in apartment-to-vestibule communication, uses closed-circuit TV monitoring in addition to conventional signal, voice and door control circuits. The project was installed by W. W. Electrical Contractors, Inc. of Jamaica, N. Y., and is described in "Closed-Circuit TV Safeguards Apartment Tenants" beginning on page 89.

LOW-VOLTAGE LIGHTING

Booming interest in safe low-voltage underwater lighting for home swimming pools is encountering some small but vexing problems. Excellent 12-volt lighting equipment and lamps are readily available. But secondary wiring requirements and transformer characteristics are unfamiliar to many. While these have little to do with safety, they can importantly affect installation and performance. Associate Editor John H. Watt has been scouting current field experience and will present a special report next month on this timely subject.

ELECTRICAL MATERIALS COST INDEX

BASE LINE (1000) REPRESENTS COSTS OF TYPICAL ASSORTMENT OF MATERIALS FOR A SELECTED JOB AS OF NOVEMBER 1, 1951. INDEX POINTS REPRESENT THE VARIATION OF THESE SAME MATERIAL COSTS AS OF THE FIRST OF EACH MONTH.



SOURCE - NATIONAL PRICE SERVICE, CLEVELAND, OHIO

EC&M Type "PT" Magnetic Control

Boosts Crane Performance, Saves on Upkeep...

Photos courtesy A. O. Smith Corporation

• DC cranes operate with a new "feel" when EC&M Type "PT" magnetic control replaces manually operated controllers. Not only is output improved, but there also is a saving in upkeep cost. Down-time is practically eliminated.

The results at A. O. Smith Corporation (as itemized at right) are typical of the improvements obtained on hundreds of cranes now equipped with "PT" control. Moreover, this compact magnetic control occupies about the same space as manual control—and the cost is comparable.

Modernize your existing cranes now with "PT" control. Available with or without protection, for all DC motors up to 55 hp for both new and old cranes.

How "PT" Control improved on manual control at A.O. Smith

- Faster acceleration without skidding wheels
- Reduced commutator dressing and 50% less upkeep
- Higher all-day output through more efficient hook movements
- Reduced operator fatigue and better load-spotting ability

GET THE FACTS *in Bulletins 6131 and 6132*

Write Square D Company, EC&M Division, 4500 Lee Road, Cleveland 28, Ohio

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wherever electricity is distributed and controlled

7061

Washington Report

DECEMBER • 1961

"Substantial but non-spectacular" economic growth in 1962 was forecast by a group of economists from Government, business, and education, meeting jointly in Ann Arbor, Mich., last month. Consensus was for a 7% growth in Gross National Product (GNP), from $520 billion in 1961 to $557 billion in 1962, based on increases in 1) defense spending, 2) inventory accumulation, and 3) auto sales. This forecast is slightly below that of President Kennedy's Council of Economic Advisers, which has implied an estimate of GNP for 1962 of $570 billion.

Other economic predictions resulting from this meeting included: unemployment will decline to 4.2 million jobless, or 5.8% of labor force; FRB Index of industrial production will climb to 119.5% of 1957 average, from September rate of 112%; Consumer Price Index (cost-of-living) will rise, 1.5 points from September's index of 128.3% of 1947-49 average; hourly earnings in manufacturing are expected to increase 8 cents from September level of $2.34 average; and corporate profits will rise from an estimated 3rd quarter 1961 annual rate of $47.8 billion to $51.6 billion for all of 1962.

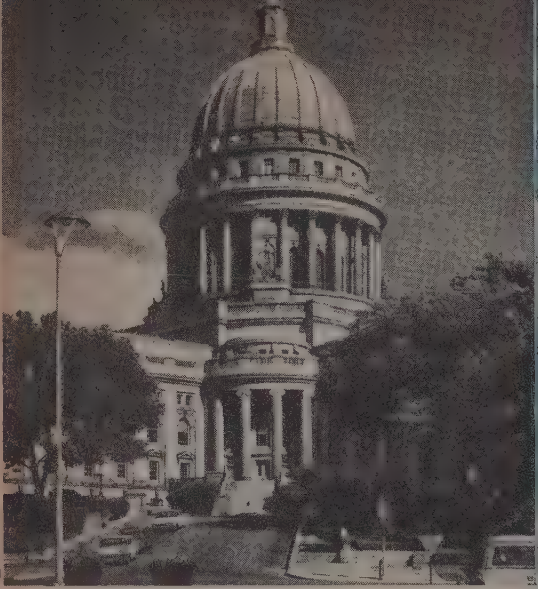
Fourth quarter economy statistics will reflect new highs for most factors. For example, some of the latest available statistics include: gross national product is at an estimated record annual rate of about $537 billion; personal income in October was at a record seasonally-adjusted annual rate of $425 billion; private housing starts in October were at a seasonally adjusted annual rate of 1,442,000, up 4% from September, and highest since December 1959; unemployment has been holding steady at slightly less than 7% of total labor force, is expected to decline in November and December; industrial output in October was at a record level of 113% of 1957 average; retail sales in October were a seasonally adjusted $18.6 billion, second highest on record, and Secretary of Commerce Hodges predicted that November and December retail sales would rise 4% to 5% from same months of 1960.

New construction spending in October was 5% greater than for the same month of 1960. Total spending was $5,286 million, of which $3.7 billion was for private construction, and $1.6 billion was for public fund construction. The seasonally-adjusted annual rate of construction spending in October was $58.4 billion, or approximately 11% of the total economy.

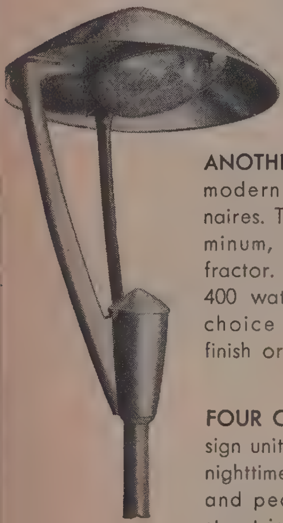
Capital spending by business firms for new plant and equipment will hit a $35.9 billion annual pace in this current quarter, according to Commerce Dept. estimate. It was at a $34.8 billion annual rate in the 3rd quarter. Total spending plans for 1962 amount to $35.8 billion, or 4% more than in 1961 by all business, and 7% more than in 1961 by manufacturing firms, according to McGraw-Hill Dept. of Economics' annual fall survey.

Highway spending during first half of 1962 will probably decline, as the Kennedy Administration has canceled its previous "speedup" in road spending. The action affects states' authority to commit U. S. funds during first two quarters of 1962.

Production of electricity in the U. S. has been running ahead of year-earlier rates by an average of about 7.5%. Gains have been recorded for all geographic areas, but strongest gains have been in the Rocky Mountain and Pacific Southwest areas. Lowest gains have been recorded in the Southeast.



ADDED BEAUTY FOR LOCATIONS like this. The Styled Mercury unit directs the light downwards and eliminates glare. It illuminates 11,000 square feet to 3 footcandles. You need fewer and shorter poles, and less wiring, to get the desired level of light.



ANOTHER IN THE FAMILY of modern Styled Mercury luminaires. The entire line is all-aluminum, with Holophane® refractor. Choice of 1000, 700 or 400 watt ratings. Available in choice of brushed aluminum finish or five decorator colors.

●

FOUR OF THE LATEST design units provide excellent nighttime illumination for traffic and pedestrians on this busy street in a shopping section. ▶

L-M Announces Another Graceful Desig In The New Styled Mercury Light Famil

Line Material's Styled Mercury luminaires are a family of high quality, high intensity lighting units. The latest addition to the Styled Mercury line is the upsweep design installed in the well-lighted street shown above.

These are large, handsome luminaires, styled for Line Material by a noted industrial designer. They will contribute daytime beauty and excellent nighttime lighting to any street, park, mall, public square, or parking area.

Line Material is a leading manufacturer of outdoor lighting designed specifically for the application. L-M also provides competent Lighting Application Service by experienced lighting engineers, available through Authorized L-M Distributors.

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Ask your Authorized L-M Distributor for bulletins, or mail the coupon.

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Line Material Industries, Milwaukee 1, Wisconsi
Please send me details on L-M Styled Mercury family o
luminaires, and name of nearest distributor. ECM-121
Name__________
Company__________
Address__________
City__________State__________
Type of Area To Be Lighted__________

-M PTL'S AT HOLIDAY INN MOTEL, Springfield, Missouri. PTL luminaires are weatherproof, in rushed aluminum or choice of six decorator colors. Exceptionally easy to install. Top reflector simply tilts for maintenance or relamping. With or without photocontrol, for incandescent or mercury with built-in ballast. Choice of seven IES light patterns.

L-M'S STYLED MERCURY, the ultimate i styling for streets, parking areas, malls, shopping centers, etc. Available in 1000, 700 o 400 watt luminaires.

L-M LAWN-GLO LUMINAIRE available in traditional or three contemporary designs. For homes and commercial applications where soft, low-level lighting is desired. High grade, all-aluminum unit with many desirable features; weatherproof; easily installed.

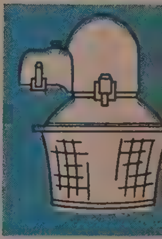
Increase Nighttime Traffic With L-M's Modern, Efficient PTL(TM) Luminaire

Contemporary styling and high lighting efficiency are combined in L-M's Post Top Light. The PTL luminaire has a scientifically designed optical system, with reflector-refractor combination that directs light down, not up and out where it is annoying.

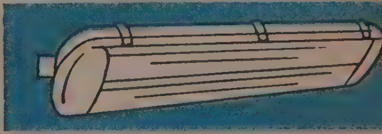
PTL'S can be installed anywhere; replace old-style units, or provide efficient lighting for new installations. Excellent for public and private applications for hotels, motels, pools, parks, marinas, driveways, amusement parks, shopping centers, churches, hospitals, and airports, because it directs the light down, not up.

Get Information on L-M Outdoor Lighting

L-M equipment is specifically designed for the application. L-M provides a complete line of luminaires, in a wide variety of types, in fluorescent, mercury, and incandescent. Also Lighting Application Engineering Service, available through Authorized L-M Distributors. Ask your electrical wholesaler, or mail the coupon.



L-M SUBURBANAIRE is available in mercury or incandescent. For farms, neighborhood streets, church grounds, parking lots, many other areas where medium-intensity efficient lighting is desirable.



L-M FLUORESCENT LUMINAIRES are available in a wide variety of styles for street, airport, subway and tunnel lighting. In choice of deep or shallow units.

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McGRAW-EDISON COMPANY
Outdoor Lighting

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SWITCH NOW AND SAVE THE DIFFERENCE

Here's how changing from copper to Rome's aluminum TW building wire can improve your profit picture

The figures in the table tell the story. An installation using *aluminum instead of copper building wire usually costs less.* Savings on wire cost vary with size, as indicated in the table. Simply select the size and multiply the difference in cost by the amount of wire required. It follows, too, that the more times you use aluminum, the more you save. And don't forget, lightweight aluminum is easy to handle. For example, 1000 feet of No. 1 AWG copper Type TW weighs 115 lbs. more than aluminum wire of equivalent current-carrying capacity. Those are pounds you *don't* load, unload or carry. The savings in dollars are obvious. And you'll appreciate the ease of handling with the first installation—and every one that follows. For the full story on Rome Aluminum TW wire, contact your nearby Rome distributor or sales representative. Or, write to Rome Cable Division of Alcoa, Dept. 7-121, Rome, N. Y.

Rome Synthinol Type TW with aluminum conductor is available in a full range of sizes starting with #6 AWG. Underwriters' Laboratories approved. The insulation, a thermoplastic compound, is flame-resistant, oilproof, easy to pull, free-stripping and has extremely high dielectric strength.

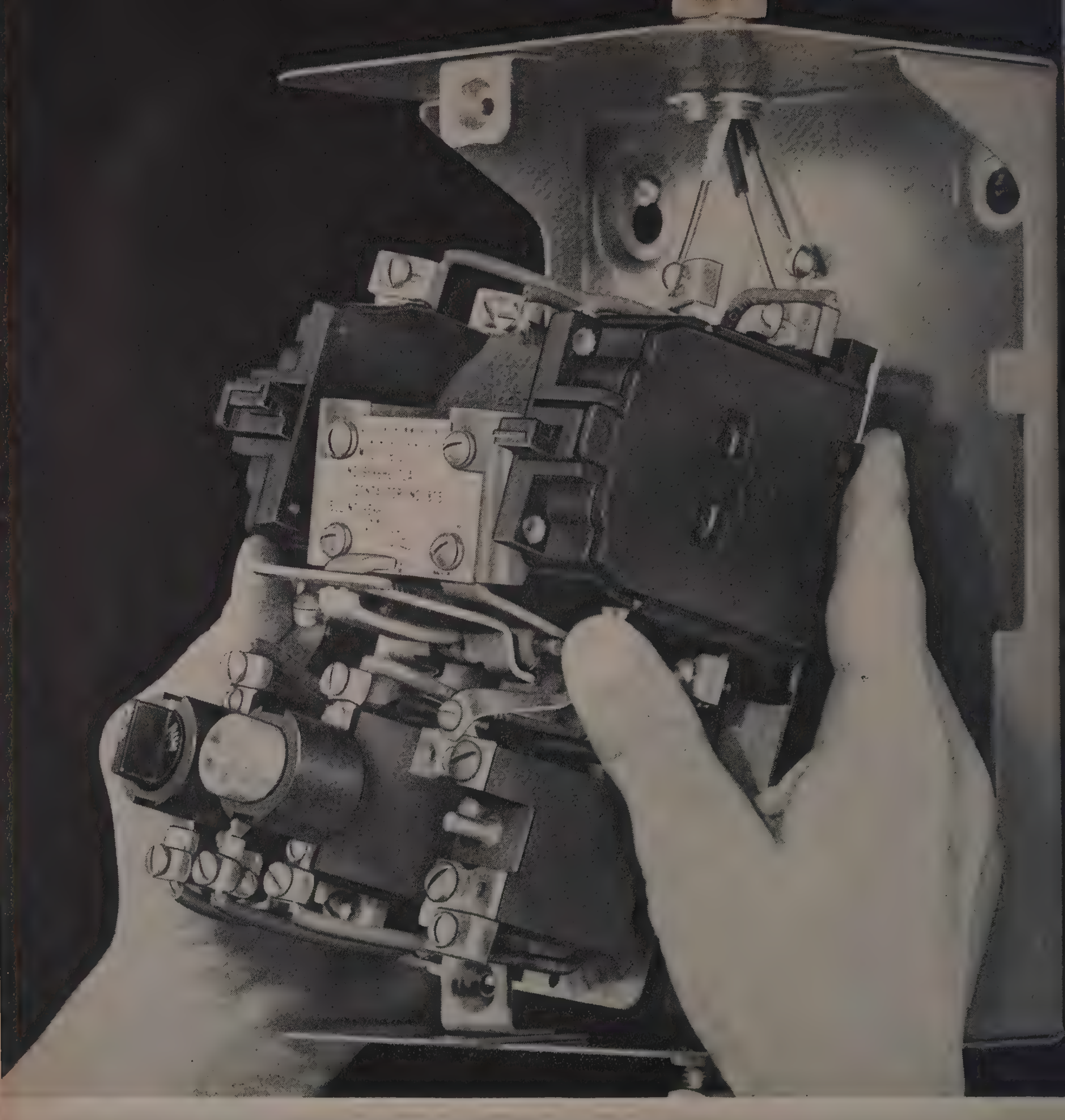
ALCOA
ROME CABLE
DIVISION

ROME SYNTHINOL BUILDING WIRE

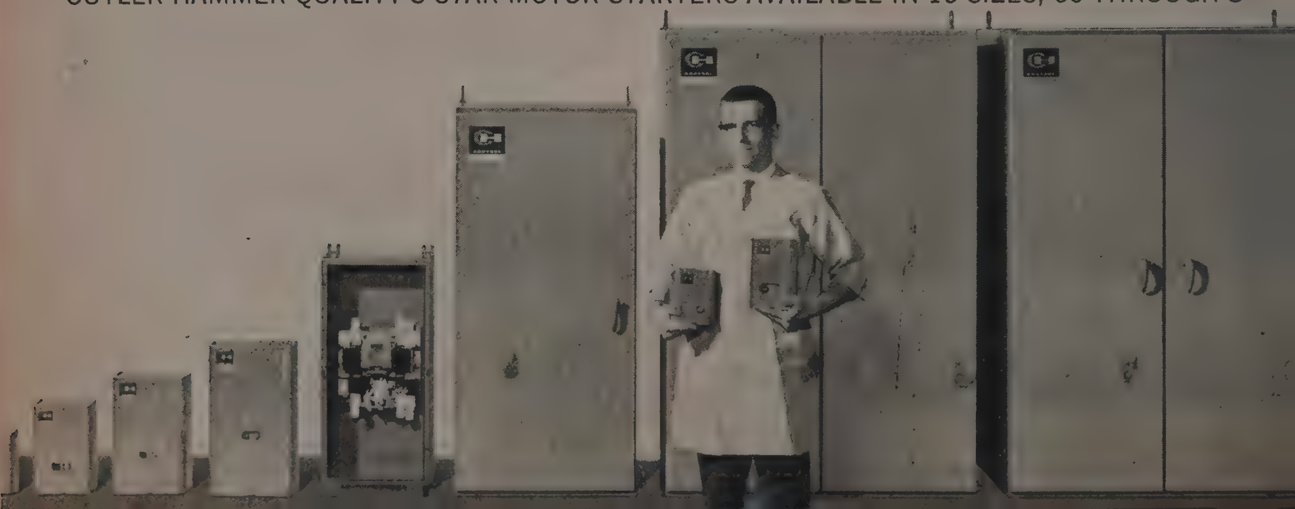
TYPE TW – 600 VOLTS

Underwriters' Approved

COPPER			ALUMINUM			SAVINGS	
SIZE	NO. OF STRANDS	LIST PRICE	SIZE	NO. OF STRANDS	LIST PRICE	DOLLARS	PERCENTAG (Approx.)
6	7	$ 67.30	4	7	$ 54.10	$ 13.20	20%
2	7	137.00	1/0	19	109.00	28.00	20%
4/0	19	406.00	300 MCM	19	311.00	95.00	23%
500 MCM	37	948.00	750 MCM	61	729.00	219.00	23%



CUTLER-HAMMER QUALITY 3-STAR MOTOR STARTERS AVAILABLE IN 10 SIZES, 00 THROUGH 8



CONTROL

CUTLER-HAMMER MOTOR STARTERS

Still the proven standard of quality...always in stock for immediate delivery

Millions of satisfactory operations in thousands of applications have proved the unmatched quality of Cutler-Hammer across-the-line magnetic starters. That this line is still recognized as the leader—nine years after the original design was developed—is a great tribute to the years-ahead thinking of Cutler-Hammer engineers.

FIRST IN '53—STILL THE LEADER IN '61

Since the Three Star line was introduced in 1953, many improvements have been made; magnet coils that far exceed NEMA standards, for example. But many achievements of the original design—vertical, dust-free contacts; overload relays adjustable to within 3% of actual full-motor ratings; provision for 2 or 3-coil overload relays in the same enclosure—are features no other manufacturer has been able to improve. You can safely bet that when these pace-setting features are improved, it'll be another Cutler-Hammer development.

ALWAYS AVAILABLE FOR FAST DELIVERY

You'll find the smaller sizes of Cutler-Hammer Starters always in stock at your local distributors—larger sizes immediately available from the factory. We hope you'll make your own feature-by-feature comparison between the Cutler-Hammer line and any other starter on the market. Look especially carefully at such vital advantages as ease of installation, high interrupting capacity, coil construction and accessibility.

Regardless of what features you select as the criterion of superiority, we're sure you'll choose Cutler-Hammer after you've made your unbiased comparison.

If you're one of many companies being forced to stock two sets of parts because of design changes, now is an excellent time to standardize on Cutler-Hammer.

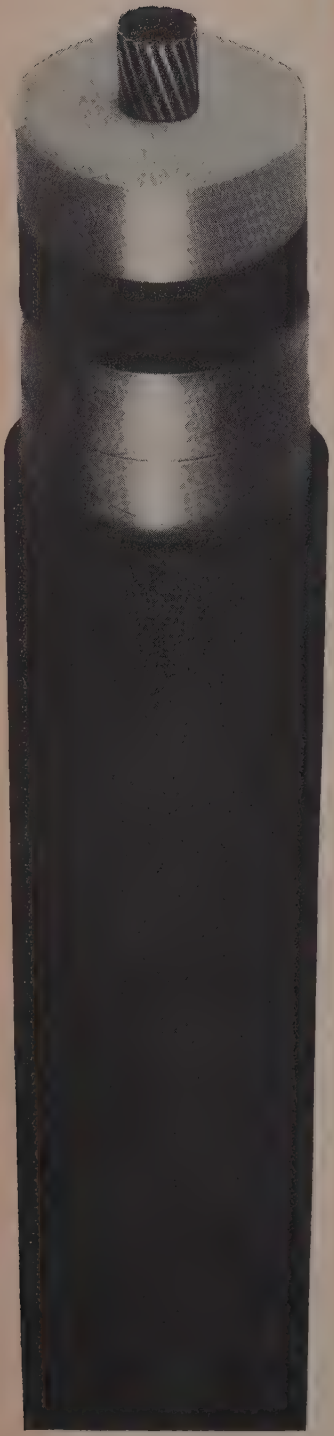
Call your distributor or local Cutler-Hammer Sales Office soon. Or write for Publication LO-70-Y241.

WHAT'S NEW? ASK..

CUTLER-HAMMER

CONTROL

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. • Associates: Cutler-Hammer Canada, Ltd.; Cutler-Hammer Mexicana, S. A.



*Here are five important questions . . . and their answers . . .
on an important new Simplex development in
electric power distribution and transmission*

HIGH VOLTAGE POLYETHYLENE

INSULATED POWER CABLES

Q. *What are some of the advantages of Simplex polyethylene-insulated high voltage cables?*

A. Low dielectric constant (nearly 1/2 that of paper cables) . . . Low power factor (nearly 1/10 that of paper cables) . . . Low dielectric loss (nearly 1/20 that of paper cables) . . . Very high insulation resistance (at least 10 times that of paper cables) . . . High dielectric strength . . . (equal to paper cables).

Q. *What are some of the outstanding physical properties of Simplex polyethylene?*

A. Light weight (62% of paper cables) . . . High tensile strength (1800-2000 p.s.i.) . . . High elongation (400% minimum).

Q. *Where can Simplex polyethylene cables be used?*

A. In many places where rubber or paper cable is used. Typical installations are direct burial, duct or conduit, aerial and submarine.

Q. *What is the highest voltage at which Simplex polyethylene cables are rated?*

A. Simplex now has polyethylene cable rated as high as 46KV A-C. Development work now in progress is expected to extend Simplex polyethylene's voltage range to 69KV or higher.

Q. *Has Simplex high voltage polyethylene cable been thoroughly field tested?*

A. Yes, as the leading producer of polyethylene cables, Simplex has in service more than 330 mile-years of polyethylene-insulated cable in the 5KV to 46KV range.

Send for complete information.

Simplex
WIRE & CABLE CO.
EXECUTIVE OFFICES: Cambridge, Mass.
Plants at Cambridge, Mass., Portsmouth, N. H., Westbury, L. I., Monrovia, Calif.

ADVANCE®

These exclusive ADVANCE developments give you the . . .

Through outstanding engineering developments and modern manufacturing facilities, ADVANCE TRANSFORMER COMPANY has become the world's largest manufacturer devoted exclusively to the production of quality fluorescent lamp ballasts. These precision built, power regulating instruments supply exacting amounts of electrical energy for the efficient operation of all fluorescent lamps and are aptly called "THE HEART OF THE LIGHTING INDUSTRY."®

Continuing research and constant new developments in both engineering and manufacturing divisions have made possible the introduction of many new ballasts with exclusive patented features. Thus, ADVANCE provides lighting equipment manufacturers, designers, architects, engineers, contractors and other fluorescent lamp ballast users the world's most extensive line of fluorescent lamp ballasts. When you use ADVANCE, there is a ballast for every specific purpose, never a need to compromise.

koolest
safest
quietest
FLUORESCENT LAMP
ballasts
IN THE WORLD

"The Heart of the Lighting Industry"®

In Canada: Advance Transformer Co. Ltd., 5780 Pare St., Montreal, Quebec.

ADVANCE® TRANSFORMER CO.
WORLD'S LARGEST EXCLUSIVE MANUFACTURER OF FLUORESCENT LAMP BALLASTS
2950 NO. WESTERN AVE. CHICAGO 18, ILL. U.S.A.

INCREASE YOUR CURRENT

American Steel and Wire
Division of
United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
Tennessee Coal & Iron Division, Fairfield, Ala., Southern Distributors
United States Steel Export Company, Distributors Abroad

CARRYING CAPACITY 45%

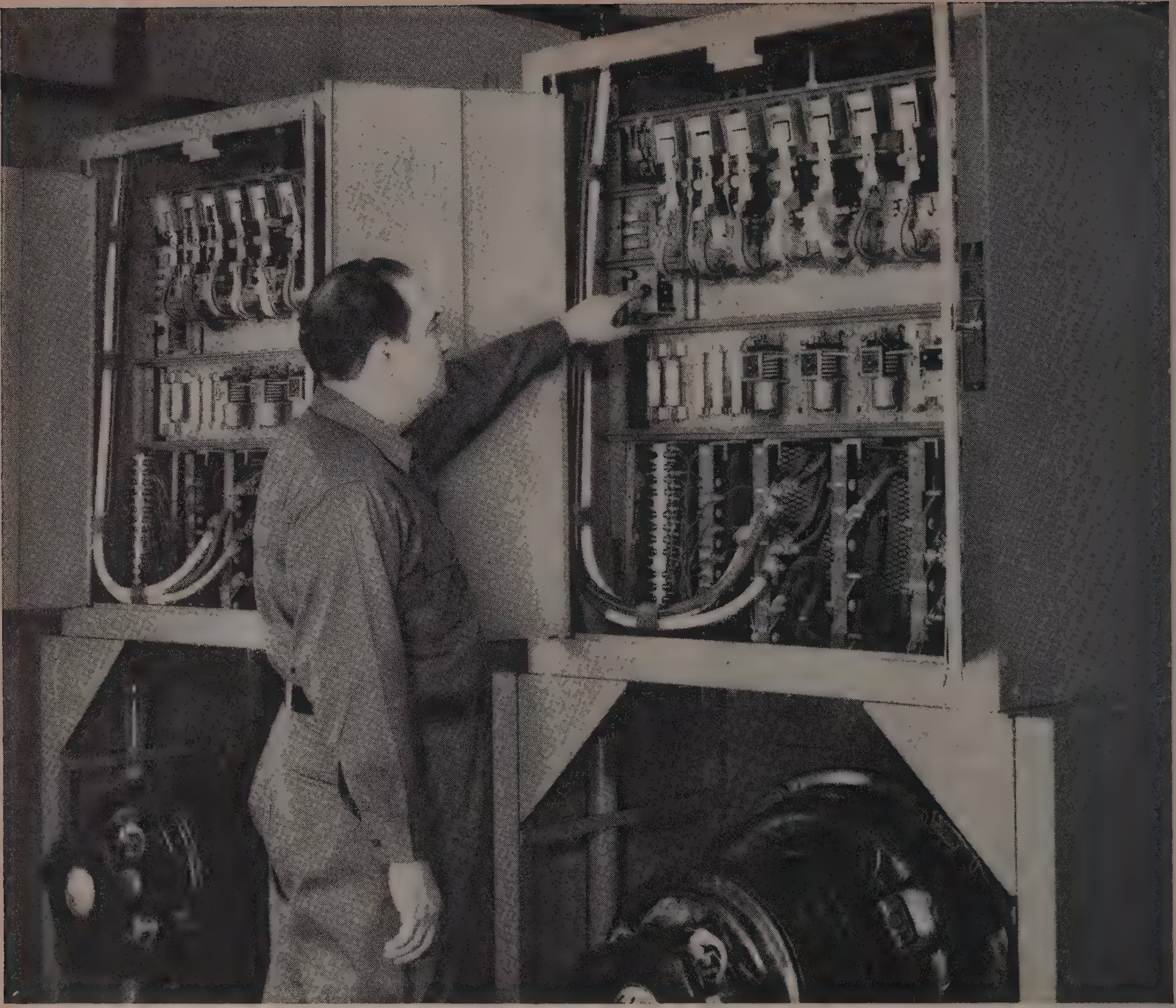
...with USS Amerzone-B insulation*

Amerzone-B butyl rubber insulation can be safely operated continuously at 90°C copper temperature. This means you get a 45% increase in current-carrying capacity with Amerzone-B as compared to the capacity of standard 60°C rated compounds. For network service, Amerzone-B will withstand emergency overload copper temperatures *up to 260°* for short periods without damage. No other rubber insulation has such exceptional resistance to heat, moisture, ozone and cold. You can bend it at —40°F. without cracking. Ozone tests to industry standards show no damage to this dense, nonporous insulation. Amerzone-B insulated cables installed over 12 years ago are just as good today as they were when installed. It's the ideal insulation for 5,000 to 15,000-volt cable. You can use USS Tiger Brand type RR Cable with Amerzone-B insulation anywhere . . . bury it, put it in conduits or ducts, string it overhead.

USS Tiger Brand type RR Cables are also made with other types of rubber insulation, each one compounded to do a special job. For complete information on Amerzone-B insulated cables or any other Tiger Brand Cable, call our nearest Sales Office or write American Steel and Wire, Dept. 1600, Rockefeller Building, Cleveland 13, Ohio.

USS, Tiger Brand and Amerzone-B are registered trademarks

*Conditions: 3 single conductors # 4/0 in 2½" conduit (exposed & enclosed), 40°C ambient air temperature



THW building wire, insulated with BAKELITE vinyl, easily copes with the heavy current load required to power DC elevator generators. It is listed by Underwriters' Laboratories for 75 deg. C. service in either wet or dry locations.

THW Wire insulated with BAKELITE® Vinyl meets the demand for greater current carrying capacity

THW building wire insulated with quality BAKELITE Brand vinyl permits greater current carrying capacity in the same conductor size . . . just one of the many ways in which BAKELITE vinyl offers electrical contractors and engineers increased economy and convenience.

The higher heat resistance of THW wire insulated with BAKELITE vinyl also provides greater protection against heat generated by overloads and high environmental temperatures and permits the use of thinner insulation on larger conductor sizes, thereby allowing the use of smaller conduits or increased circuits in existing ones.

Easier stripping, splicing and pulling through conduits is provided by the smooth, uniform insulation of vinyl on THW wire . . . leading to faster, neater wiring operations.

Along with these benefits, insulation of BAKELITE vinyl is tough, withstands abrasion and rough handling, and possesses superior resistance to moisture and most chemicals. For more information on why you should specify and use THW building wire insulated with quality BAKELITE vinyl, write today to Dept. KC-41L, Union Carbide Plastics Company, Division of Union Carbide Corporation, 270 Park Avenue, New York 17, New York. *In Canada:* Union Carbide Canada Limited, Toronto 12.

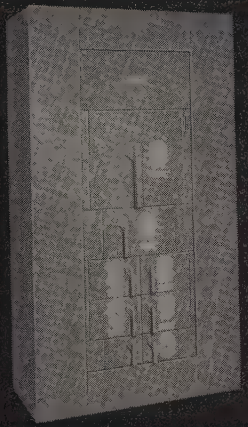
UNION CARBIDE

BAKELITE and UNION CARBIDE are registered trade marks of Union Carbide Corporation.

FRANK ADAM ELECTRICAL EQUIPMENT

The Industry's Best Buy In Safety, Performance, Durability

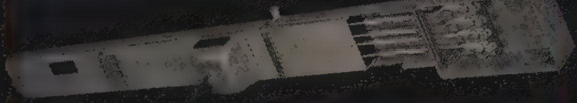
LIGHTING PANELBOARDS
Plug-In or Bolt-On Circuit Breaker Types.



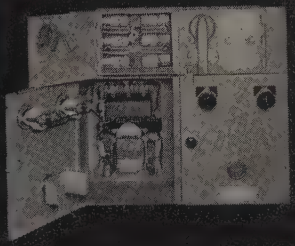
S-A-W DISTRIBUTION PANELBOARDS
Last Word in Heavy Duty Fusible Protection.

POWER PLUGIN BUSDUCT

Plug-In Outlets 10" Centers.
250/1500 Amps., 600 V. AC.



MIDGET BUSDUCT
Extends Busduct System for Less Than Wire, Cable and Labor Costs. 100 Amps. Unfused, Fusible or Breaker Plug-In Units.



NON-COMBINATION
Starter and Fusible Switch Assembled.

COMBINATION
Single Enclosure With Starter and Switch or Starter and Breaker

PLUG-IN MOTOR STARTER UNITS
Plugs into Panelboards or Switchboards.
Eliminates Separate Motor Controls.

No matter what the size and complexity of the project—no matter if the need is for the largest switchboard or the smallest safety switch—the Frank Adam name upon it is a warranty of unsurpassed quality and craftsmanship, protection and durability.

Give your clients every benefit in safety, dependability and economy of the "industry's finest"—specify, insist on, Frank Adam Electrical Equipment.

Write for catalog literature

FRANK ADAM ELECTRIC COMPANY
SINCE 1891
P. O. BOX 357, MAIN P. O. • ST. LOUIS 66, MO.

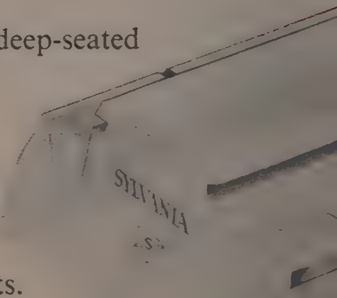
busduct • panelboards • switchboards • service equipment • safety switches • load centers • Quikheter

The Ideal Answer to Your Industrial Lighting Problems... Sylvania's

Here is a totally-new series of industrial lighting fixtures designed to make your lighting fixture selection simple and positive.

Sylvania's Power-V Series includes *all of the features you want* in industrial lighting equipment—ruggedness, versatility, adaptability, ease of installation and maintenance, trimness, simplicity, high efficiency, excellent lighting characteristics . . . and all at competitive prices.

This is a completely modern fixture series from the deep-seated channel design to the wide, rugged embossed reflector.



The Power-V Series is designed to provide the high level, quality lighting job you need to increase production and efficiency and to decrease rejects and accidents. Because of the wide choice of models and lamp types, you can practically custom-design a lighting system to fit your exact illumination requirements.

Each Power-V model features:

- **Reflectors with deep embossments and ribbing for strength and rigidity.**
- **Simplicity of design and labor-saving devices which reduce installation and maintenance time.**
- **Excellent lighting characteristics with 430 ma Rapid Start and Instant Start; 800 ma Rapid Start; or any size of the powerful 1500 ma Rapid Start lamps.**
- **A low silhouette to provide neat, trim appearance.**

From every angle, we believe the Power-V Series to be the finest line of industrial lighting fixtures ever produced. May we send you the details? Just write to:

Sylvania Lighting Products
A Division of Sylvania Electric Products Inc.
One 48th Street, Wheeling, West Virginia

For New Construction or Industrial Modernization...
Be Sure to Investigate Sylvania's **Power-V** *Series*

Power-V

Series

POWERFUL

Recommended footcandle levels are reached easily with Power-V . . . and you maintain quality standards, too. Designed to use 430 ma, 800 ma or all types of 1500 ma lamps.

RUGGED

Sturdy, rigid fixtures featuring double V embossments on reflector. Withstands rough handling or accidental bumps and abuse.

NEAT

Trim, shallow appearance assured through positive integration of channel and reflector. Low silhouette enhances any installation.

SIMPLE

Clean design, minimum parts, labor-saving devices add up to simplicity of installation and maintenance.

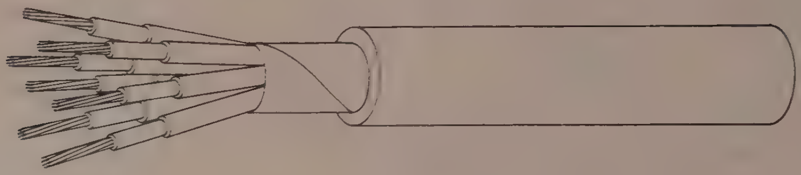
LIGHTING FIXTURES BY

SYLVANIA

SUBSIDIARY OF

GENERAL TELEPHONE & ELECTRONICS

Progress report from COLLYER . . .



Collyer C-143 Poly E/PVC CONTROL CABLE – another progressive contribution to BETTER CONTROL CABLE installations . . .

Here is why and how it will help you —

Quality throughout

Collyer C-143 Control Cable consists of copper conductors (solid or stranded, as specified) insulated with 20 mils of polyethylene and jacketed with PVC which is color coded. The insulated and jacketed conductors are twisted with fillers when required. The assembled conductors are taped with Mylar over which a PVC sheath is applied.

Moisture and ozone resistant

Environmental moisture is no problem to Collyer C-143 Control Cable because of the excellent moisture resisting properties of polyethylene. And Collyer C-143 Control Cable is ideal for use in atmospheres with heavy concentrations of ozone because ozone has no effect on this construction.

Individual PVC jackets

PVC, an important feature of Collyer C-143 Control Cable, is used as a conductor jacket to provide mechanical protection for the polyethylene insulation. PVC conductor jackets are of bright and permanent colors. The PVC jackets and sheath also provide flame retardant properties essential to vital control circuits.

Easy to install – easy to trace

Collyer C-143 is small in diameter . . . light in weight . . . economical to install. It's easy to strip and clean to handle. Brilliant color coding means quick, accurate and permanent circuit identification.

Excellent electrical properties

Collyer C-143 Control Cable is extremely durable. The high dielectric strength and excellent aging properties of the polyethylene assure the user that this cable will have long life. Because we use PVC conductor jackets for color coding, we are able to use polyethylene in an unblended form for insulation, thus providing the optimum electrical and physical properties of this material.

Modern design and cost

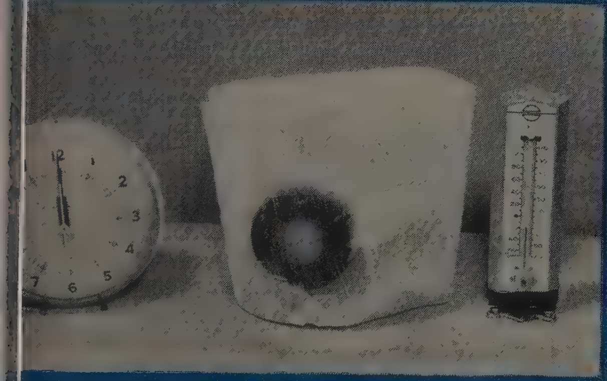
Collyer C-143 Control Cable takes advantage of the best and most modern materials and manufacturing techniques available today. As a user of this cable you get the happy combination of superior performance at lower cost.

For more information on this high-performance control cable, see your Collyer Distributor or Agent . . . or write for Catalog Section C-143 to COLLYER INSULATED WIRE CO., 265 Roosevelt Avenue, Pawtucket, Rhode Island.

Collyer Cables

EN IT'S COLD-THE SPLICE WILL HOLD
TH SLIPKNOT CW
YL ELECTRICAL TAPE!

MARKABLE VERIFIED TESTS PROVE THAT UL-APPROVED
KNOT CW WORKS PERFECTLY UNDER THE
SEVERE COLD-WEATHER CONDITIONS!



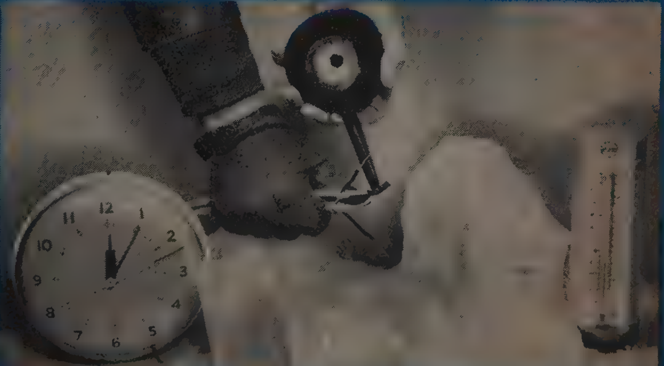
of Slipknot CW is frozen solid in a block
at 14° F below zero.

Tape is broken out of ice . . .
still at 14 below . . .

and in this frigid atmosphere remains completely flexible — strips perfectly from roll — even with ice still imbedded in the core.

° F below zero, this remarkable vinyl tape
rips easily from the roll . . .
emains completely flexible . . .
ticks down instantly — molds perfectly —
holds permanently!

in your home freezer
— write for a sample roll
on your letterhead today!



35 seconds later perfectly conforming splice is made. Temperature . . . still 14° below!

APES BY
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THRU
COGNIZED
TRIBUTORS

PLYMOUTH RUBBER COMPANY, INC.
QUALITY SINCE 1896 CANTON, MASSACHUSETTS

Niagara-Mohawk Power Corporation, Huntley Station, Buffalo, New Yo

Power company selects Abolite...

Gets easy-on-the-eyes lighting, and holds the line on costs

INSTALLATION DATA

Abolite HMFAU-2400 Alzak aluminum uplight fixtures with 1000 watt color-improved mercury lamps. Ceiling height 65′, mounting height 55′, spacing 18′ x 24′. Average maintained footcandle level: 30.

Electrical Contractor:
Buffalo Electric Co.

Engineers at this power plant wanted high bay lighting that combined comfort with low installation and maintenance costs. They got it by installing Abolite fixtures equipped with 1000 watt color-improved mercury lamps.

Though these fixtures are mounted 55 feet high, they provide comfortable, glareless 30 footcandle average light throughout the building. Light directed upward through the fixtures' open tops washes out dark ceiling shadows. 35° shielding of lamp virtually eliminates glare.

Most important, this system costs less to buy and maintain than a comparable fluorescent system because fewer fixtures are needed. Maintenance costs are less, too, because air circulating through Abolite's open-top fixtures sweeps them clean of dulling dust.

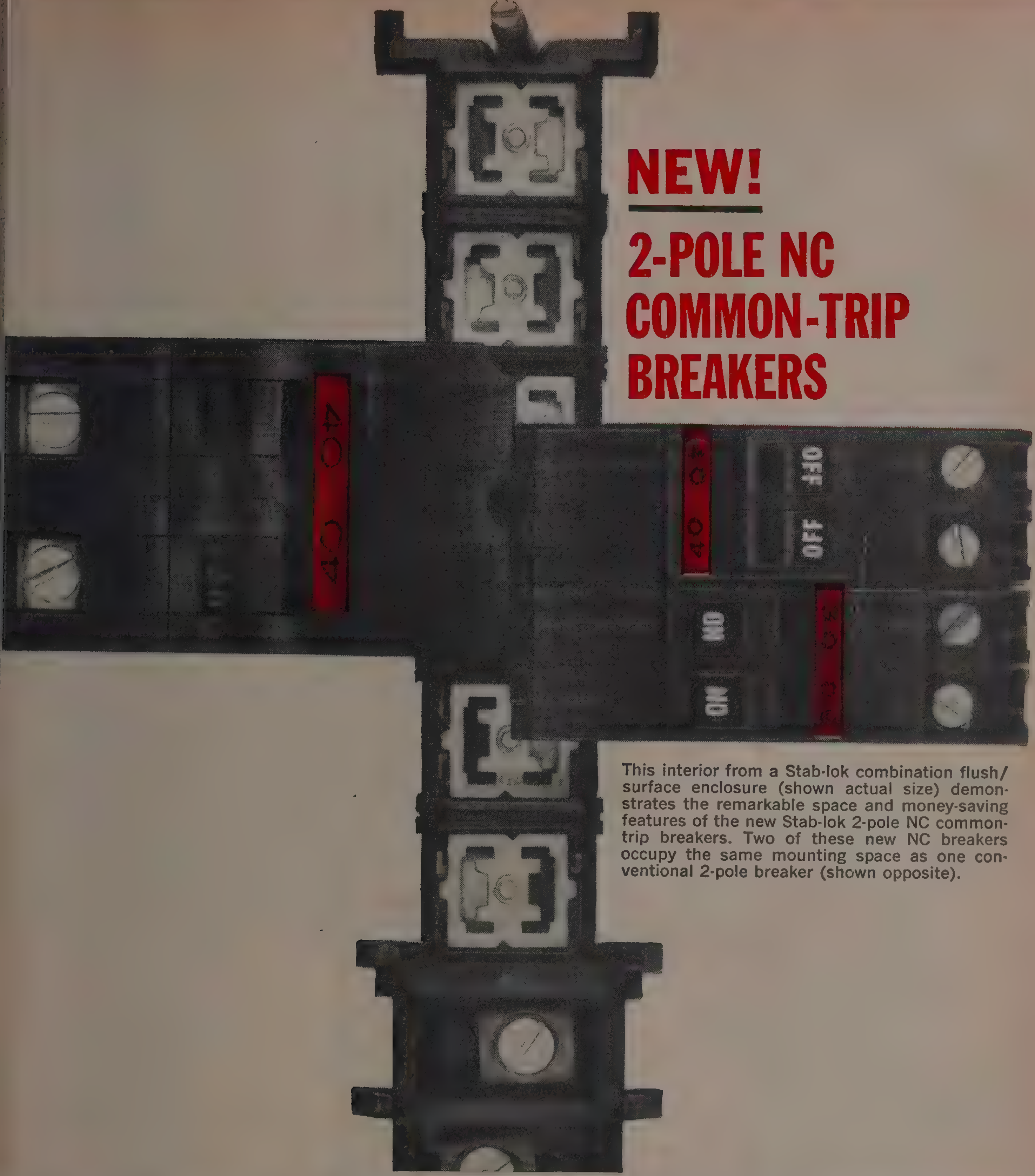
For high bay lighting that combines both comfort *and* economy, specify Abolite fixtures. The complete line includes RLM-approved Alzak aluminum and porcelain enamel fixtures for use with all kinds of mercury and incandescent lamps. Write for more information.

ABOLITE *Lighting*

THE JONES METAL PRODUCTS COMPANY
West Lafayette, Ohio

NEW!

2-POLE NC COMMON-TRIP BREAKERS



This interior from a Stab-lok combination flush/surface enclosure (shown actual size) demonstrates the remarkable space and money-saving features of the new Stab-lok 2-pole NC common-trip breakers. Two of these new NC breakers occupy the same mounting space as one conventional 2-pole breaker (shown opposite).

ow! twice the number of 2-pole circuit breakers in any Stab-lok enclosure!

e's real economy! With the revolutionary, new 2-pole NC aker, you can install twice the number of 2-pole circuit akers than you ever could before!

s newest addition to the famous Stab-lok® system* is a true mon trip breaker. An internal common trip bar disconnects poles when either pole experiences an overload or short uit! What's more, it is impossible to install the 2-pole NC ker improperly—it stabs into opposite phases automatically!

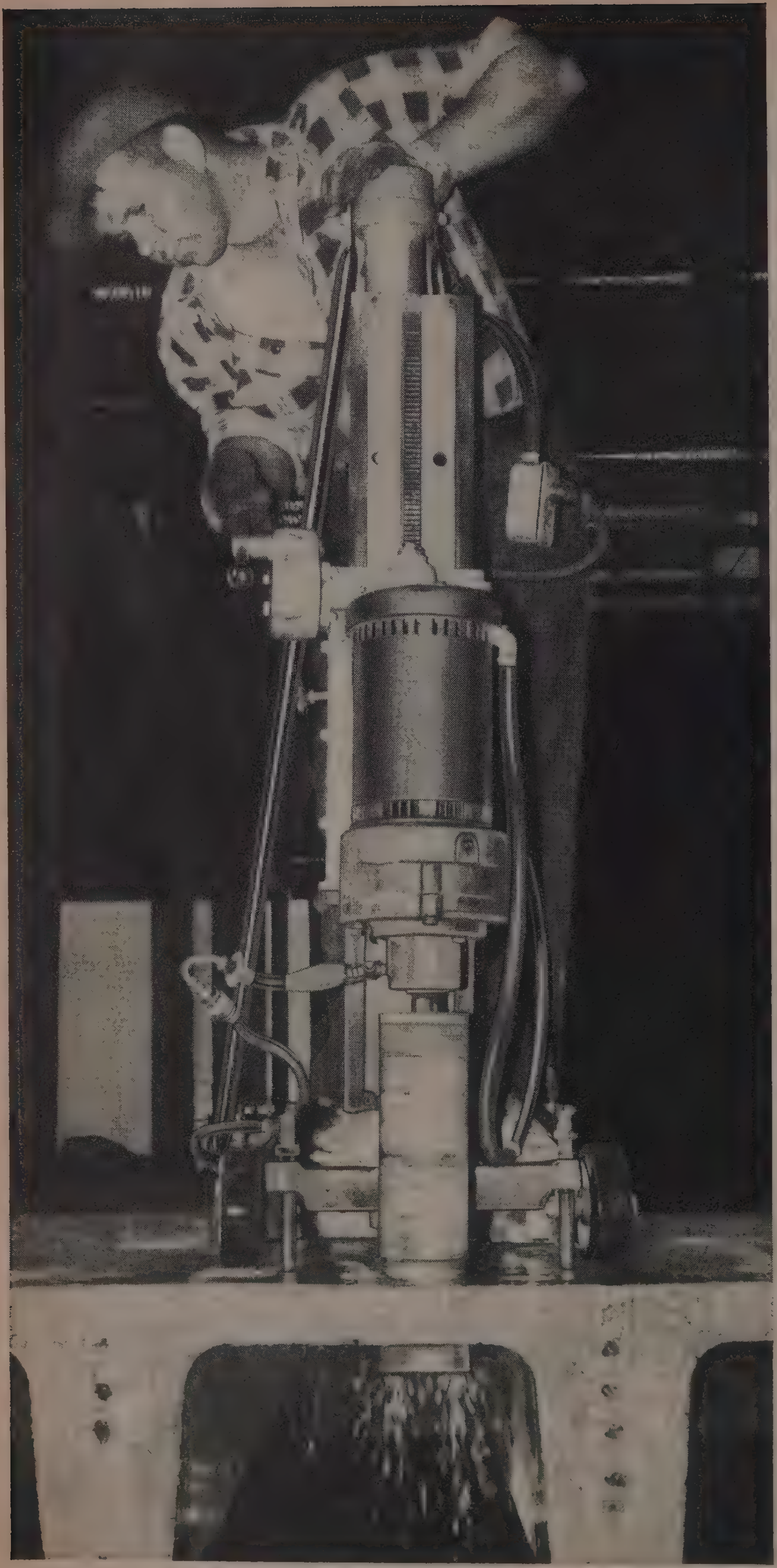
Designed to set the pace for the industry for years to come, the new 2-pole NC breaker has engineering features worthy of Stab-lok: ambient compensation, automatic reset, box lugs and time-proven 4-way compression stabs.

The new Stab-lok 2-pole NC breaker—available now in 15, 20, 30 and 40-ampere ratings—is the latest reason why Federal Pacific, with more than 75 million Stab-lok breakers installed, is first in modular circuit protection!

FEDERAL PACIFIC ELECTRIC COMPANY

50 PARIS STREET • NEWARK 1, NEW JERSEY

*The Stab-lok System: The industry's only full-sized half-inch breakers. You get complete inventory flexibility at ⅓ the cost! Why strap yourself with "married couples"? / Stab-lok combination flush-surface enclosures. You get 2 enclosures in 1! Use the exclusive picture frame or throw it away . . . at no extra cost! / All Stab-lok enclosures—box, interior and trim—come complete in one package. One item to purchase . . . one item to stock! / Engineered to be trouble-free. Proved by 11 years of industry leadership!



Drilling holes for steam pipes in Johnson County, Kansas, Hospital by Paragon Heating and Plumbing Co.

WORLD'S *FASTEST* CONCRETE DRILL

Fastest because it's the only dril
with the adequate power necessary
for low-cost drilling of any size hol
up to 14" in diameter in heavil
reinforced concrete — prestresse
slabs—any masonry material.

G. E. designed the 3 H.P. inductio
type motor exclusively for Clipper—
and designed it for heavy dut
drilling under the most demandin
conditions.

This gives the Clipper Core Dri
superiority in speed and perform
ance over units using converte
hand drill motors. AND only Clip
per gives you speed selection, 300
800, 1500 RPM, to give you th
right speed for every drilling job

Write for complete information o
CALL COLLECT to your Clipper Fac
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help you select the right Clippe
drill for your next job and sho
you how to turn your worn ou
diamond bits into new Clipper Bit
—at a savings.

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MANUFACTURING COMPANY
2801 WARWICK, KANSAS CITY, MISSOURI

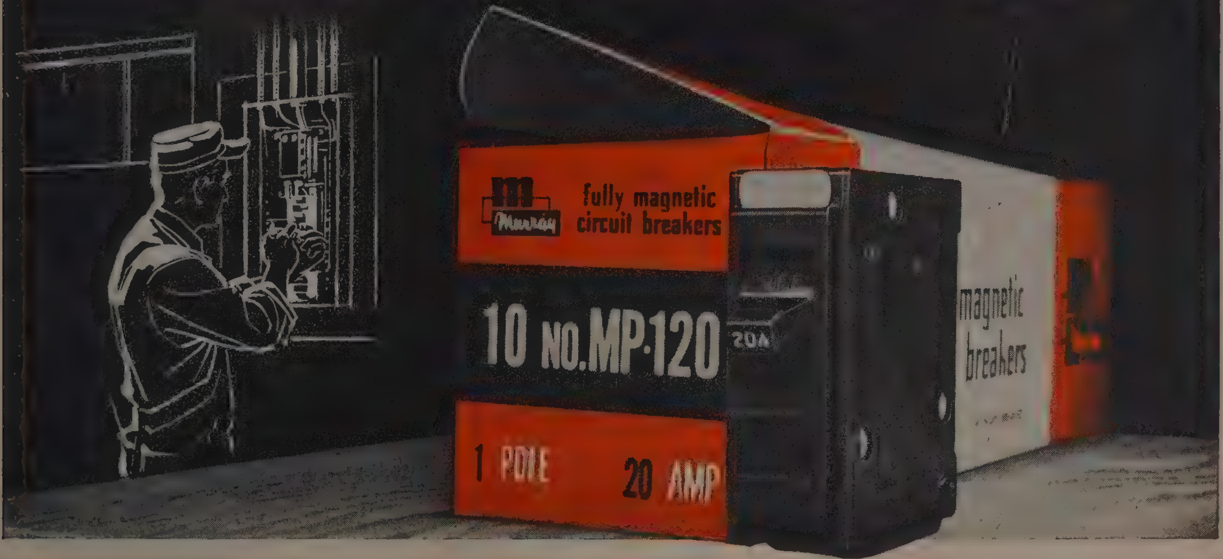
Factories: Australia, Brazil, England, France, Germany, Italy, U.S.A.

Sold Direct From Offices and Warehouses Coast to Coast

fully magnetic, competitively priced . . . and now

GUARANTEED FOR LIFE

Murray "MP" Circuit Breakers



Build Business, Profits, Prestige!
Install the breaker that's best all around—best for you, best for your customers, and *Guaranteed For Life!*

You'll like working with "MP" breakers. *Fully magnetic* and unaffected by heat, these breakers never need derating, carry full rated load, never trip unnecessarily, can be installed anywhere it's most convenient for you or your customers.

Secondly, your customers will appreciate knowing that the breakers you install are *Guaranteed For Life.* It shows you're using the best, helps you get the business.

Extra Sales Aids For You!
You get a special Guarantee Certificate to leave with each customer plus a special sticker for your own promotion to use on each load center. This will boost your prestige, bring extra business your way.

Here's How You Can Cash In On This Guaranteed For Life Program!

See your Murray wholesaler today for full information on this precedent-breaking promotion. Ask him also about the material he has available to help you sell builders and home-owners on Murray *Guaranteed For Life* "MP" circuit breakers. Or write Murray directly for complete details.

Murray

Backed By A Full Line Of Load Centers

Murray Manufacturing Corp., 1250 Atlantic Avenue, Brooklyn 16, N.Y.
Dept. B-12

Gentlemen:

A circuit breaker that's *Guaranteed For Life!* I'm interested. As soon as possible, send me complete information on everything.

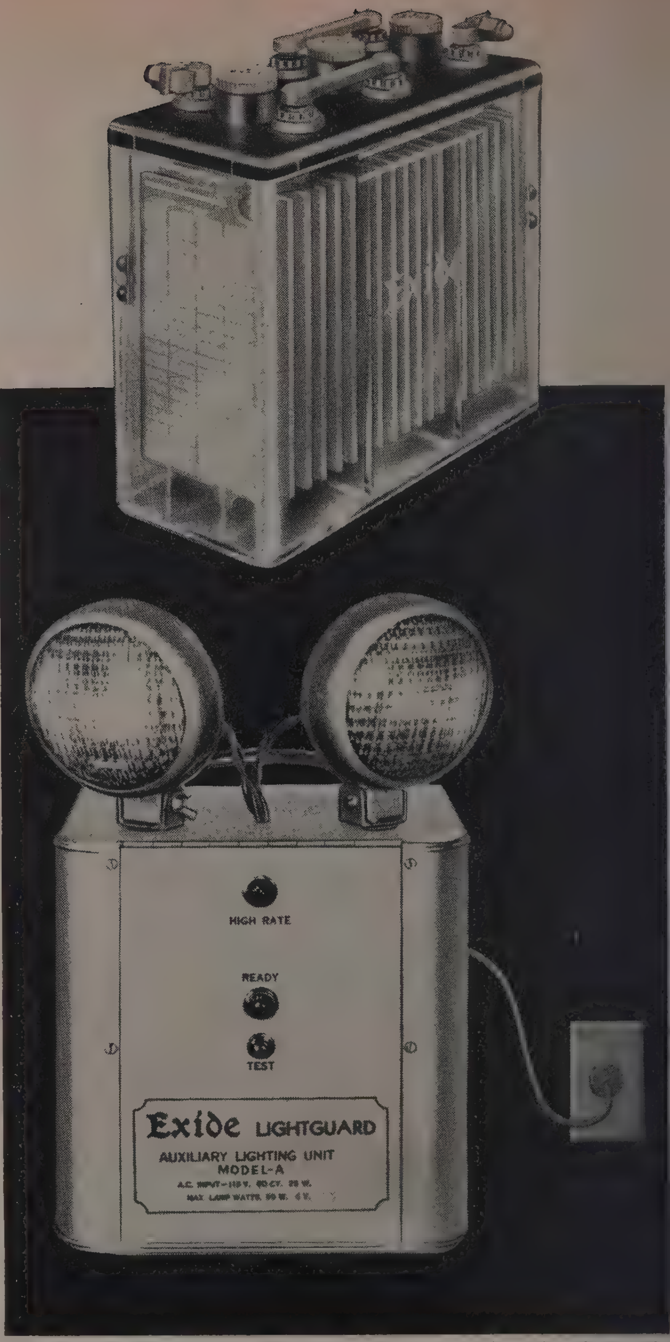
Name____

Address______________________________________

My wholesaler is________________________________

YOU NEED A GOOD BATTERY FOR GOOD LIGHT

Only Exide Lightguard® emergency lighting units have genuine Exide storage batteries. Extra capacity and extra life are built in. When your regular power fails and Exide Lightguard goes on, you're assured of extra hours of strong light. And you can go for a good many years without battery replacement expense. Exide Lightguard is completely automatic. Goes on when lights go out. Built-in charger automatically brings battery back to capacity after each time used and keeps it there. Easy to install. Just plug into regular a-c outlet. Ask about it at your nearby electrical distributor's. Or write for literature. Exide Industrial Marketing Division, The Electric Storage Battery Company, Philadelphia 20, Pa.



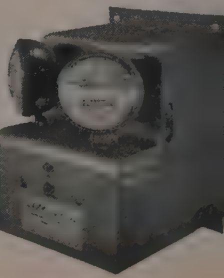
When regular lights go out, Lightguard goes on . . . instantly and automatically. This is Model A, the most popular model. Available for one, two or three lamps.

Exide®

INDUSTRIAL MARKETING DIVISION
The Electric Storage Battery Company
ESB

◀ **Dry cell model**
Most economical to buy. Same lamp brilliance as storage battery model. Uses standard dry cells.

To cover large areas ▶
New Model E. Three times the battery capacity. Can handle up to five lamps.



SpaceMaker is an Allis-Chalmers trademark.

the only real drawout 2- to 5-kv controller...with a contactor you can get at, into, around...without tools

▲ This means no unbolting—no wires to unfasten. You rack the contactor to "disconnect position" with the door closed. Open door. Roll contactor carriage out. It's that simple, that quick . . . and safe. ● Inspection? Lift out arc chutes and barriers. Rotate pole pieces to fully expose contact structure. Fuses? Lift them out, too. No tools, all the way. ■ SPACEMAKER control. First dramatic new achievement in high-voltage motor control in more than a decade. To learn more about the many cost-cutting features, call your A-C distributor or representative. Or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.

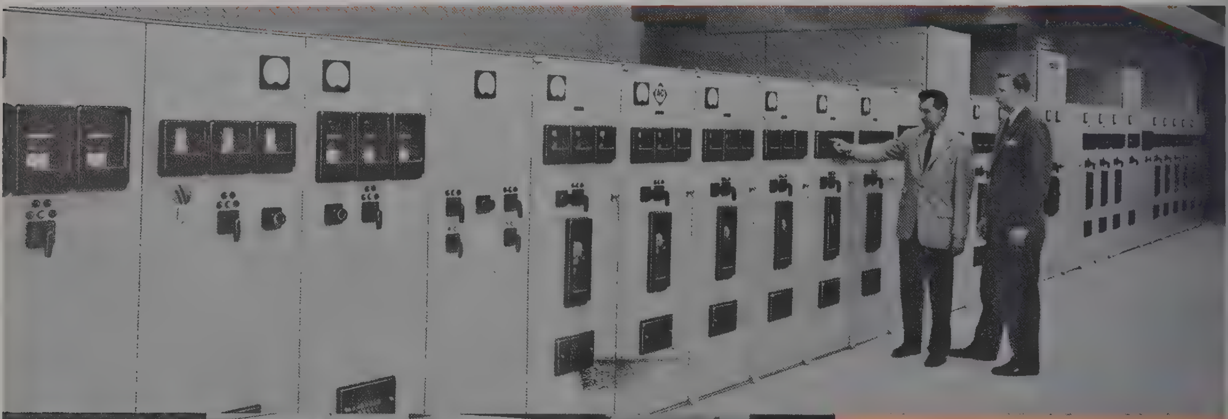
LET'S COMPARE THESE FEATURES

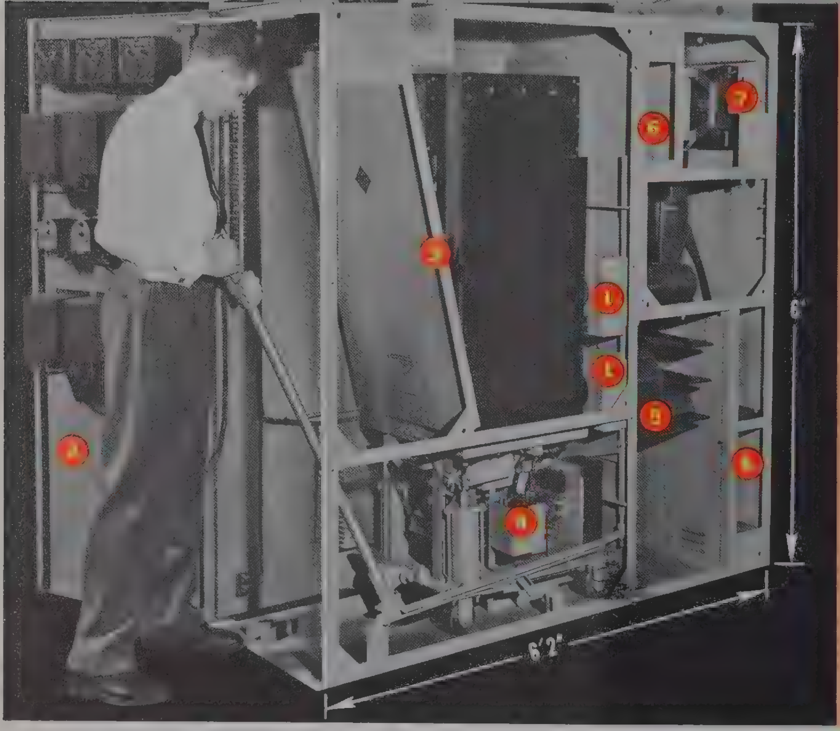
	SpaceMaker Controller	Controller "A"	Controller "B"
Two starters in 90" height	Yes	No	No
Drawout construction	Complete	Partial	No
Simultaneously disconnects all six main leads (line and load)	Yes	Line Only	Line Only
Automatic shutters isolate line	Yes	Yes	No
"No-tool" inspection of contacts	Yes	No	No
Track-resistant, flame-retardant insulation	Yes	No	No
Contactor construction	Double Break	Single Break	Single Break
Overload relays visible from outside	Yes	No	No

ALLIS-CHALMERS

A-1521

ALLIS-CHALMERS





▲ 4.16 kv metal-clad equipment serving a west coast city.

1. Separate compartments for current transformers.
2. Full panel metering and relaying.
3. Double-lock panel for operator safety.
4. Easy service accessibility without dismantling.
5. Glass polyester insulation throughout.
6. Separate up-feed and down-feed cable compartments.
7. Fully cast, trunnion-mounted potential transformers.

Lowest height, easiest access

the only switchgear with fully isolated current transformers

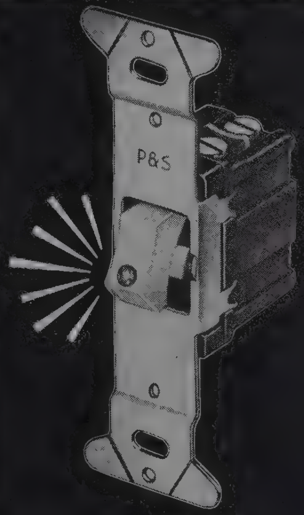
The front-accessible current transformers can be inspected, maintained or replaced without exposure to any high voltage compartment. A-C metal-clad units are just 72 inches high — means eye-level instrumentation . . . shoulder-height accessibility of component parts. And the entire panel can be used for meters and relays. Maximum compartmentation and dead-front construction offer greater safety. Buswork and components arranged for easy addition of future units.

You get rapid, one-stroke insertion of the circuit breaker. The breaker has glass polyester insulation for highest impulse strength . . . the only self-locking protective barrier . . . four-bar linkage is mechanically, electrically trip-free. Primary disconnect fingers eliminate use of garter springs, and are on the circuit breaker for easy inspection. Both stored energy and solenoid operators are available. *For more switchgear information contact your nearby* **Allis-Chalmers** *office.* A-1457

NOW! 3 NEW *P&S ROCKER-GLO SWITCHES!*

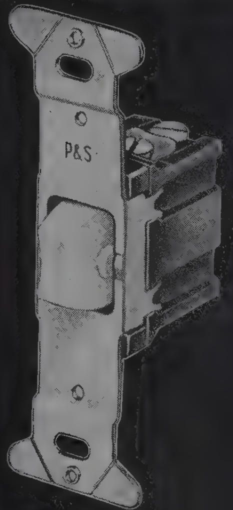
No. 2211-SL

No. 2211-SL also available in strap type No. 2221-SL



No. 2221-SP

No. 2221-SP also available in Despard (interchangeable) type No. 2211-SP



No. 2225-S

No. 2225-S also available in Despard (interchangeable) type No. 2215-S

1

LIGHTED HANDLE ROCKER-GLO

Pinpoints switch location in darkened rooms or hallways. Tiny, long-life neon lamp softly glows in OFF position only. Single pole or three-way. Rating: 15 Amperes, 120 Volts, A.C.

2

Pilot Light HANDLE ROCKER-GLO

Instantly shows when appliances or lights are on. Tiny red plastic jewel in rocker button lights in ON position only. Single pole only. Rating: 15 Amperes, 120 Volts, A.C.

3

REMOTE CONTROL ROCKER-GLO

Momentary contact, center "off" switch. Designed especially for low voltage remote control applications—controlling large banks of lighting, operating stage curtains, etc. Single pole, double throw. Rating: 10 Amperes, 48 Volts, A.C.

For more information write Dept. ECM 1261

P&S PASS & SEYMOUR, INC.
SYRACUSE 9, NEW YORK

60 E. 42nd St., New York 17, N.Y. 1440 N. Pulaski Rd., Chicago 51, Ill. In Canada: Renfrew Electric Co., Ltd., Toronto, Ontario

STEEL

depend on steel conduit from Youngstown—the most complete line in the world

You cut with a steel saw. Bore with a steel drill. Thread with steel. Bend with steel. You use steel so often that you know how good it is. Today, it's better than ever. Steel . . . as strong, familiar, reliable conduit from Youngstown's modern mills.

Get Youngstown Buckeye and corrosion resistant Yoloy rigid conduit and EMT. Buckeye for standard installations. Yoloy where corrosion is a problem. Match your needs exactly with the quality Youngstown steel conduit made to meet them.

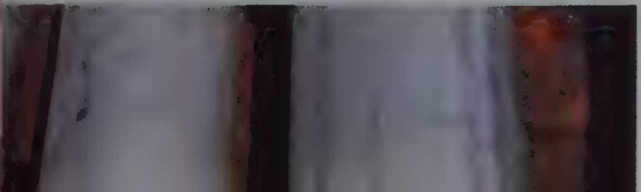
Choose Buckeye or Yoloy Hot Galvanized conduit. Even the threads are galvanized. Choose Buckeye Electro-Galvanized conduit. Clear enamel interior fishes easier. Choose Buckeye or Yoloy Black Enameled steel conduit. The finish won't wrinkle or crack when bent. Or choose Buckeye or corrosion-resisting Yoloy EMT. Electro-galvanized, coated inside and out with smooth clear enamel.

With any Youngstown quality steel conduit you get easier, kink-free bending. You get smoother threading. Clean, trouble-free handling. Faster fishing. Service masts you don't have to guy. And a modern raceway system that looks as good as it works.

On your next job, specify Youngstown steel conduit. It is readily available in sizes ½" to 6". Get prompt delivery from your electrical distributor.

Youngstown – growing force in steel

For complete information on Youngstown steel conduit, write, Dept. 26-A,
The Youngstown Sheet and Tube Company, Youngstown, Ohio



How to fasten steel to concrete:

(Old way)

1. Mark off anchor spacing on steel
2. Put proper drill in the drill motor
3. Drill the hole through the steel
4. Plot location of holes in concrete
5. Connect impact hammer to power
6. Install the proper chuck and head
7. Place self-drilling anchor in chuck
8. Now drill the hole in the concrete
9. Remove the anchor from the hole
10. Clean hole by removing chippings
11. Expander plug into anchor shell
12. Reposition the anchor in the hole
13. Drive plug into the expander shell
14. Break the head off the anchor
15. Place the steel in proper position
16. Insert bolt through holes in steel
17. Screw nut on, tighten with wrench

(Ramset way)

1. Insert Ramset fastener into the tool
2. Insert Ramset powder charge in tool
3. Depress tool on work and pull trigger

Ramset powder-driven fastenings average less than 30 seconds each. Regardless of materials. Steel to concrete or steel. Wood to concrete or steel. Including labor, Ramset reduces the cost-per-fastening a good 54% (often, much more). With no sacrifice in holding power.

Ramset® WINCHESTER-WESTERN DIVISION **Olin**
285-L Winchester Ave., New Haven 4, Conn.

Your lighting projects require the *safest* fluorescent ballasts you can specify . . . General Electric Bonus Line*. These ballasts are designed to protect against leaking, smoking, burning—*all* potential hazards or annoyances at end of life. They feature a unique, non-resetting thermal protection system—better than the best fusing—for unmatched, incident-free operation throughout their full, useful life. Put the fullest measure of lighting protection into your buildings. Write premium-quality General Electric Bonus Line ballasts into your lighting specifications.

*Trade-mark of General Electric Company

For a detailed engineering report on Bonus Line ballasts, contact your G-E Sales Engineer or write Section 403-03, General Electric Company, Danville, Illinois.

Progress Is Our Most Important Product

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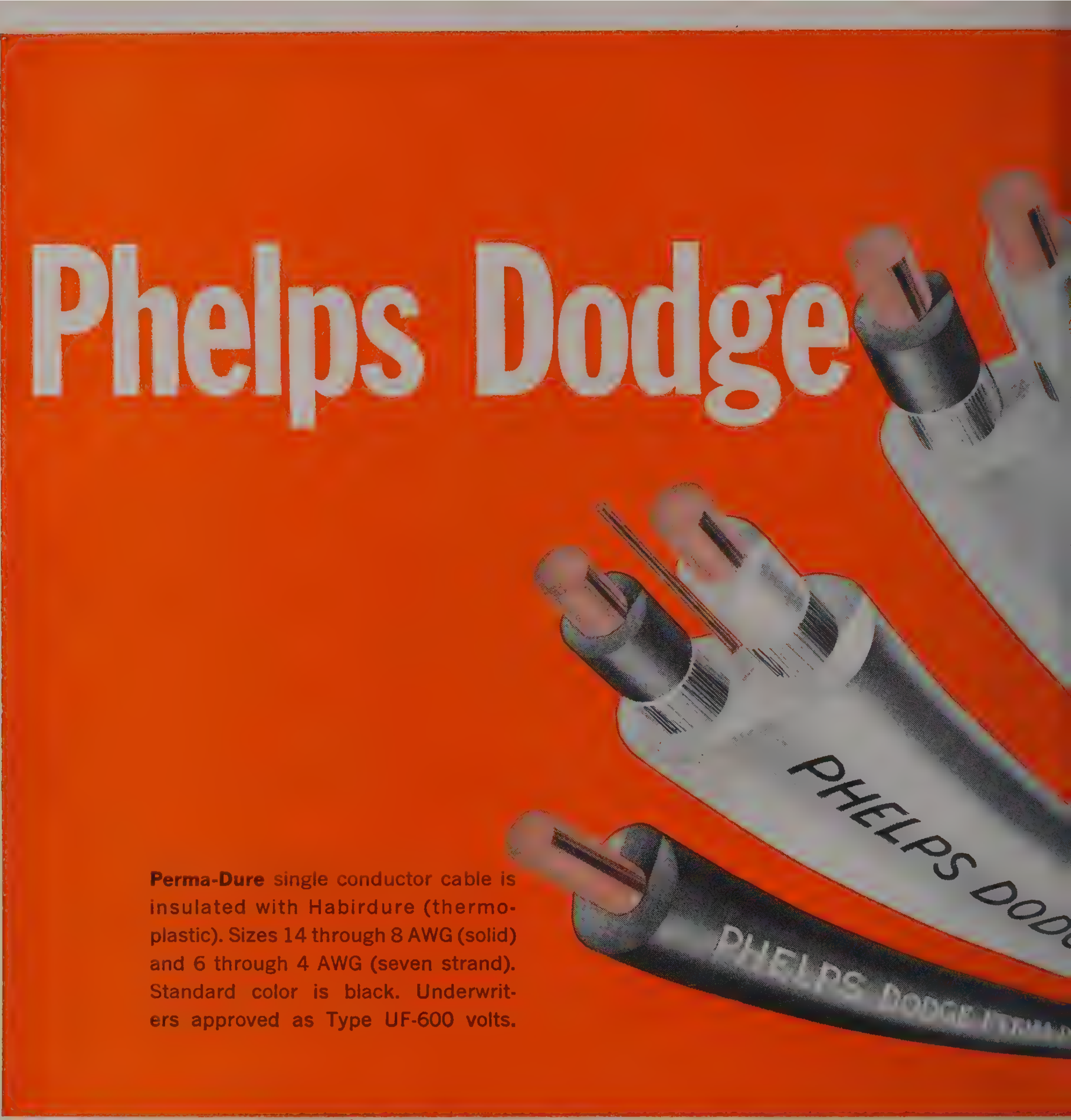


Phelps Dodge

Perma-Dure single conductor cable is insulated with Habirdure (thermoplastic). Sizes 14 through 8 AWG (solid) and 6 through 4 AWG (seven strand). Standard color is black. Underwriters approved as Type UF-600 volts.

An Economical, Dependable Cable for • Undergrou

Perma-Dure, a Phelps Dodge product, provides electrical contractors with a durable, versatile type of flame-resistant cable for industrial and commercial use.

Perma-Dure handles easily, strips readily and helps cut installation time and costs. It is supplied in single, two and three conductors for feeder or branch circuits. Under the 19 National Electrical Code, *Perma-Dure* is r ognized as suitable for:

Type UF, single and multiple conductor, feeder or branch circuit cable, for direct bu in the earth when provided with over-curre protection.

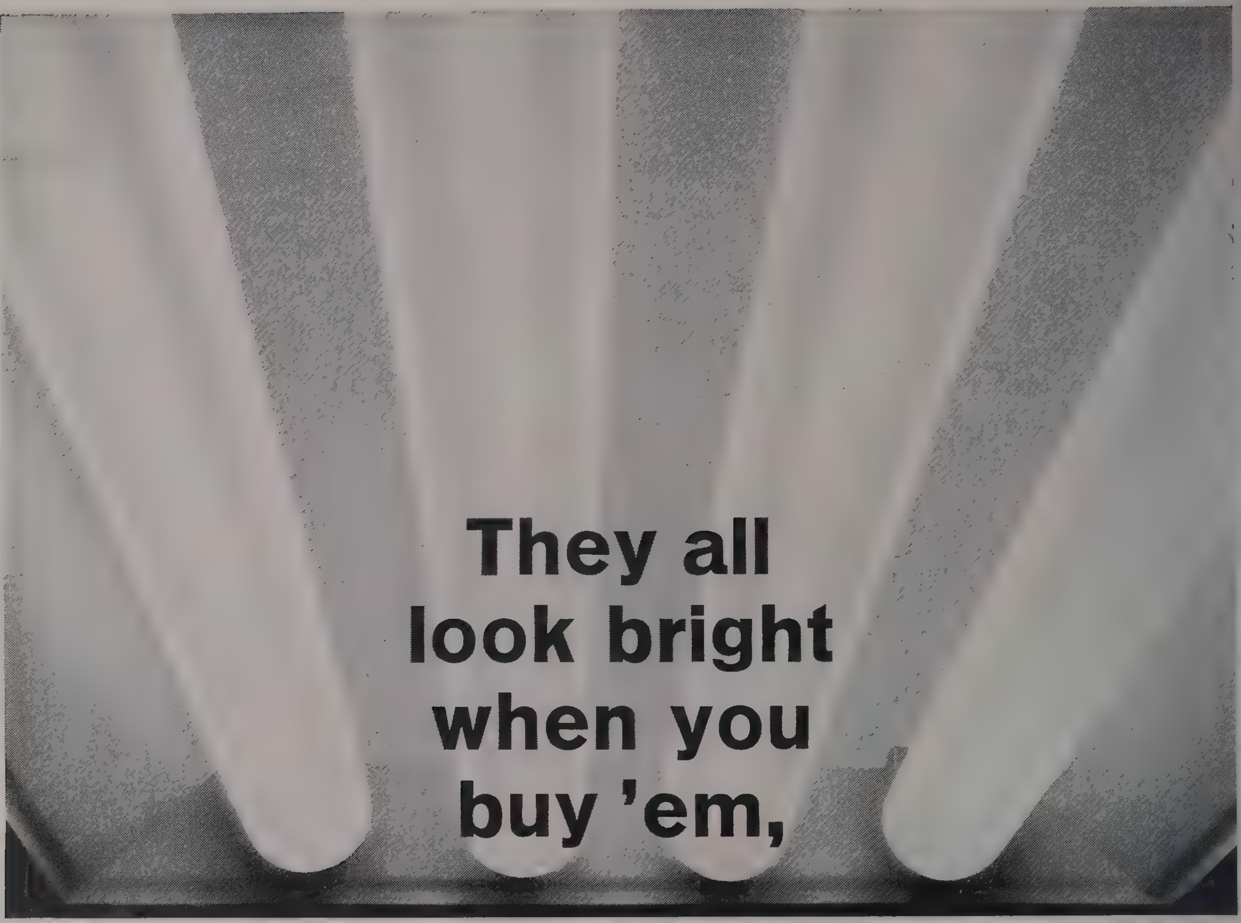
Perma-Dure two and three conductor cable is insulated with Habirdure, glass-wrapped. Conductors laid parallel under a Habirdure sheath. Sizes 14 through 10 AWG. Standard color is white. Underwriters approved as Type UF and Type NMC-600 volts. Available with and without ground wire.

iring Including Direct Burial • Interior Wiring

ype NMC, multiple conductor (moisture and rrosion resistant non-metallic sheathed cable) r installation in exposed or concealed loca- ons, in dry, damp or corrosive conditions; inside masonry or tile walls; or embedded, when suitably protected, in plaster or shallow chase in masonry.

See Your Phelps Dodge Distributor!

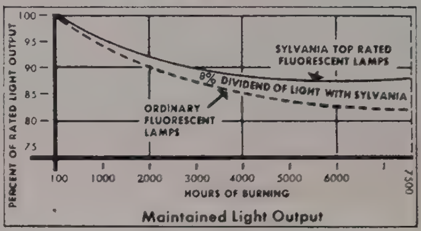
PHELPS DODGE COPPER PRODUCTS
CORPORATION
300 Park Avenue, New York 22, N. Y.



but...

Fluorescents, all burn brightest when they're new. But after the first hundred hours—that's when the difference begins to tell. The *inside* difference!

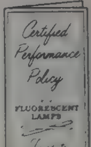
Here, in test after test, Sylvania gives you a distinct advantage: *an 8% dividend in clean, steady,* brighter light. A *longer-lasting* brighter light – *at no extra cost.*



Maintained Light Output

It's due to a new "stabilized" long-lasting phosphor developed by Sylvania engineers. And an exclusive "homogenizing" process that blends the phosphor particles evenly for uniform brightness.

No wonder Sylvania can promise lower TCL (Total Cost of Lighting—which means cost of lamps plus power plus maintenance) with this *exclusive* money-back guarantee: "If at any time a Sylvania Fluorescent Lamp fails in your opinion to provide better performance than any other brand fluorescent lamps, on the basis of uniformity of performance, uniformity of appearance, maintained brightness and life, it may be returned to the supplier for full refund of purchase price."



For longer-lasting brighter light, call your Sylvania representative. Or write: Lighting Division, Sylvania Electric Products Inc., Dept. 15, 60 Boston St., Salem, Mass. In Canada: Sylvania Electric (Canada) Ltd., Montreal.

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WIREMOLD®
ELECTRIC IDEAS

PREPARED EACH MONTH FOR ELECTRICAL CONSTRUCTION AND MAINTENANCE TO BRING IDEAS, NEWS AND HELPFUL INFORMATION TO ELECTRICAL MEN

62nd YEAR

DECEMBER 1961

WIRING LAMINATED CEILINGS .... FIRST PAGE
CODE COMMENTS .... FIRST PAGE
EDITORIAL .... SECOND PAGE
PRODUCT OF THE MONTH .... SECOND PAGE
QUIZ CORNER .... SECOND PAGE
COUPON FOR FREE ITEMS .... SECOND PAGE
GROUND TO GROUND .... THIRD PAGE
ENGINEERED SPECIALS .... FOURTH PAGE
USEFUL LITERATURE .... FOURTH PAGE
PRACTICAL TIPS .... FOURTH PAGE

Laminated Beam Ceilings Call For Surface Systems

Solid-type construction requires surface metal raceways for economy and practicality of installation

Laminated type beam ceiling construction, whether it be in the cathedral or flat-roof style has gained tremendous acceptance within the past few years. The basic reasons are obvious — efficiency and economy.

Although laminated construction has had its major play in church and school building, it is moving rapidly into other forms of commercial construction and, to a degree, home building.

The very use of the solid-construction approach, however, makes it virtually mandatory to use surface wiring systems for lighting.

Many engineers and contractors have found the use of surface metal

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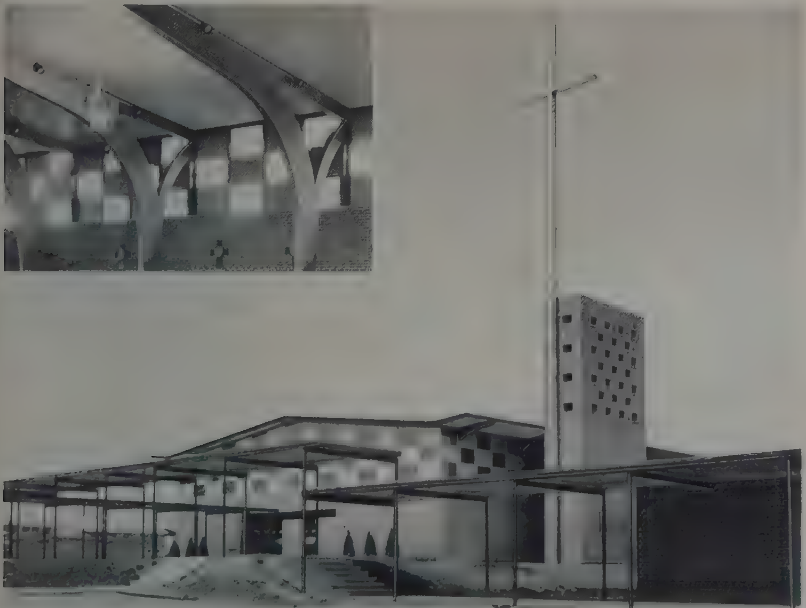

LAMINATED construction continues to grow in popularity, with churches and schools leading the parade. Wiring solid ceilings is simplified when surface systems are used. Inset shows Wiremold used for branch lighting circuits of this modern church.

Code Comments

Capacity of Wires in Raceway

Q. *When more than 3 conductors are installed in a raceway such as Wiremold 3000, does the current carrying capacity of the wire have to be reduced?*

A. According to Article 310, Section 310-11 and Notes to Tables 310-12 through 310-15, when more than 3 conductors are installed in a raceway, the allowable current-carrying capacity of each conductor shall be reduced as shown in the following table:

Number of Conductors	Per Cent of Values in Tables 310-12 and 310-14
4 to 6	80
7 to 24	70
25 to 42	60
43 and above	50

Raceway as Grounding Conductor

Q. *Is metallic surface metal raceway acceptable as a grounding conductor for portable equipment?*

A. Acceptance is given under Article 210, Section 7 which says: "Where a grounding receptacle is installed as specified in Sections 210-22(b) and 250-59, to provide grounding facilities required in Section 250-45, the branch circuit or branch circuit raceway shall include or provide a grounding conductor to which the grounding contacts of the grounding receptacle shall be connected. The metal armor of armored cable or a metallic raceway is acceptable as a grounding conductor."

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Editorial

Wiring and Christmas safety

Traditionally, at this time of the year, utilities campaign for careful checking of the wires that will light the nation's Christmas trees. As part of this program, homeowners are cautioned against frayed wires and loose connections as a contributing cause to the accidents which plague this joyous season.

This is a fine time for the contractor to "get on the band wagon" and push for safe, modern wiring throughout the home. With the impetus given by the utilities, the homeowner probably has a greater awareness than at any other time of the importance of adequate wiring.

It's a good time, too, to talk about convenient wiring — Plugmold®.

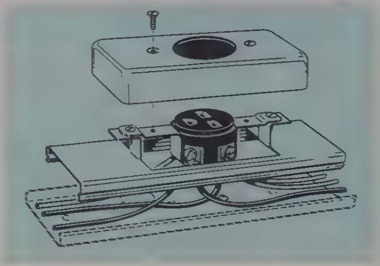
Product of the Month

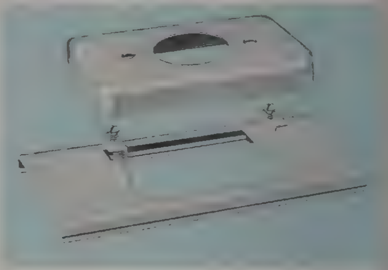
Fitting permits installation of standard device in 2200

Because the depth of Plugmold 2200 is insufficient to permit installation of standard devices within the raceway, Wiremold engineers have developed the 2246A Single Receptacle Cover.

A raised section extends ⅞-in. above the raceway cover, adding the depth necessary to install any one of a number of standard devices on 2200 without interrupting the run with boxes.

The cover has a 6-in. overall length with mounting centers for the receptacle 3.281-in. The standard cover is for a single receptacle (with hole diameter 1.44-in.), but different piercing patterns, such as for duplex receptacles or a switch, are available on special order.





Quiz Corner

Questions for this department are taken from inquiries received from the field. Your questions are welcome; indeed, they are necessary if this department is to serve you with worthwhile information. Address: Quiz Corner, The Wiremold Company, Hartford 10, Connecticut.

Q. *Can I get a replacement plastic shield for the Line-O-Lamp System I sold my customer several years ago?*

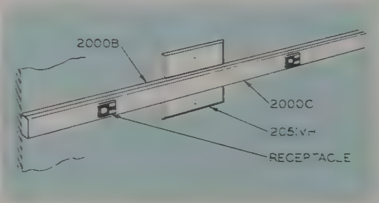
A. We have a limited stock of these shields. They are available as long as our supply lasts.

Q. *Can receptacles rated for 20 amp be installed in 2100 raceway?*

A. Although only Wiremold receptacles (rated at 15 amps) can be installed in the raceway, receptacles rated higher than 15 amps can be installed by using either a 2141 or 2144 Switch and Receptacle Box.

Q. *If there is an existing convenience outlet, can Plugmold be installed using the same circuit?*

A. Yes, use the 2051H or 2051VH Flush Plate Adapter.



Q. *Does Wiremold make a 250-volt receptacle for Plugmold 2000?*

A. On special order, Wiremold can furnish Plugmold 2000 with 2127P or 2127PG receptacles, with the 2000C cover holecut to accept these receptacles.

Q. *Does Wiremold provide a grounding receptacle as a replacement receptacle for the 5727?*

A. Use 5733G cover and a standard ASA grounding receptacle on a 5727 base.

Q. *When there are two runs of 3000 or 2100, one above the other, how do I feed both systems when the conduits come from the floor?*

A. Compartmentalized boxes are available on special order (see "Engineered Specials," fourth page).

WIREMOLD®

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Gentlemen: Please send free the checked items

NAME ______________________

COMPANY ______________________

ADDRESS ______________________

☐ Plugmold "Sampler"

☐ Electric Ideas, November 1961

☐ Electric Ideas, October 1961

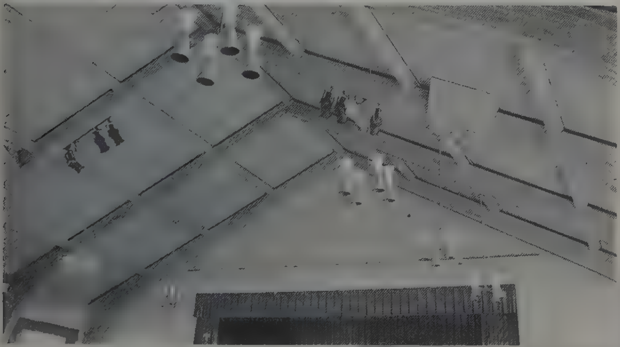
☐ Wiring Guide (Catalog 22)

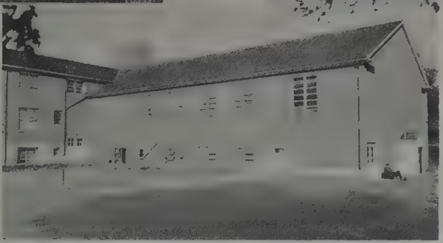
Advertisement

Laminated Beam Ceilings Call For Surface Systems

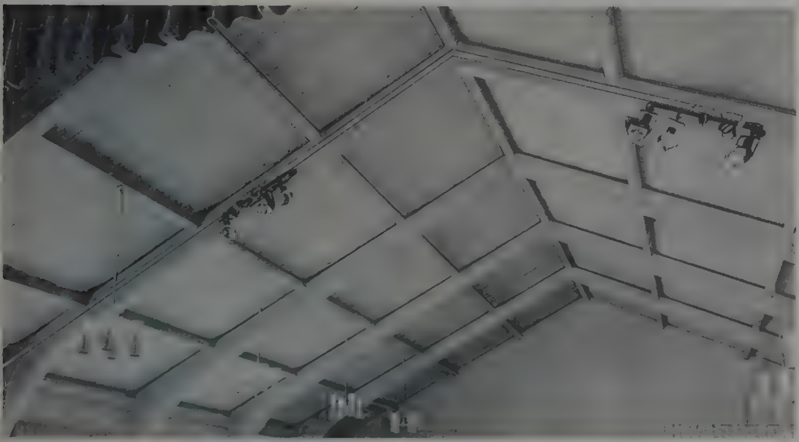
continued from first page

LAMINATED beam construction in professional office building uses metal surface raceways for branch circuit wiring to fluorescent fixtures.





AUDITORIUM in private school uses one-piece raceway system for general illumination branch circuits. Raceway color blends with laminated wood beams.



IN SAME AUDITORIUM, two-piece raceway provides outlets for plug-in spotlights used to illuminate stage. Plugmold affords unusual wiring flexibility.

raceways ideal for servicing this building method.

Both Wiremold one-piece and two-piece raceway series provide a simple, neat and unobtrusive method of branch circuit wiring.

For branch circuit runs to fixtures the one-piece raceway is generally selected as the best. This type of system provides a narrow, flat-base housing for the wires that is simply attached to the surface. Designed to permit fishing the wires through, one-piece raceways are available in a range of capacities. For example, capacities of from 3 to 10 No. 12 RU can be chosen.

Wiremold 2200 and 3000 have fittings which permit the installation of standard devices right in the raceway.

Both one-piece and two-piece systems come in a buff color which blends with wood, eliminating the need for decoration. The two-piece systems are available also in gray. Either color is a prime coat which will accept standard paint.

When laminated beam construction is specified, Wiremold surface systems provide the most flexible and economical way of wiring.

Ground to Ground

Each month we ask a question which, when answered, will help us improve our products and services to you. A frank answer will be appreciated. Answers will not be published, but will be acknowledged. Address: Ground to Ground, The Wiremold Company, Hartford 10, Connecticut.

The question of improvisation (*Electric Ideas,* Oct. and Nov. 1961) continues to intrigue our readers. The thought has been raised that at least part of the cause of improvisation is failure to make certain that the necessary material is on the truck before it leaves for the job. In line with this, how do you make sure that you have all the necessary things for a job on your truck? What kind of check-list or control device do you use?

WIREMOLD®

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Engineered Specials

Special box permits entering Plugmold from side

PROBLEM:

To provide a method of feeding twin runs of 3000 raceway, used as a Tele-Power system, on curtain wall construction in a new office building.

SOLUTION:

A Wiremold box, similar to the 3044 2-gang, was developed to permit entering one side of it with a double run of 1-in. rigid steel conduit. The box is designed to provide a barrier which separates power and telephone conductors.

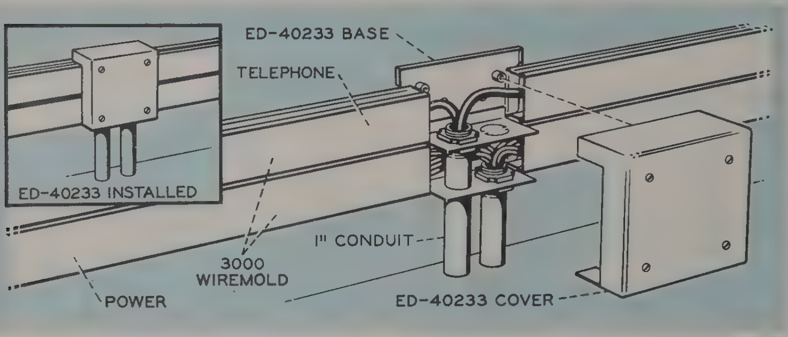
DISCUSSION:

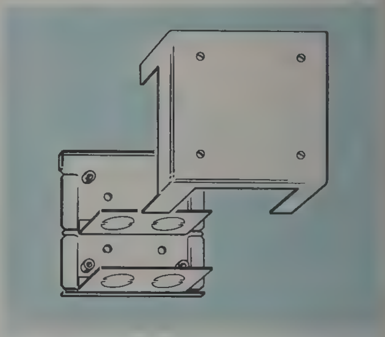
Because part of the facility will be rented, the owner of the building required the greatest possible flexibility in the use of space.

On the advice of the consulting engineer, it was decided to use a movable partition arrangement with each partition complete with its own Tele-Power run. In keeping with the flexibility approach, it was decided to use 3000 raceway to provide capacity for future needs.

Building construction is standard curtain wall with poured concrete slab floor. The panel, located in the corridor, feeds through the conduit located in the slab to the Special 3044 2-gang box and from there to the Plugmold run.

Wiremold engineers are glad to help solve in-field problems.





Useful Literature

Check coupon on second page for copies of listed items.

New Plugmold "Sampler"

New folder contains "paper samples" of Plugmold 2000, 2100, 2200 and 3000 in color-matched Wiremold buff and gray. Perforated, the 29 in. long strips of actual size Plugmold may be placed against any surface to show prospects how installations will look.

Season's Greetings

The people who are Wiremold sincerely extend the warmest good wishes to you, their friends. May the coming year be the best you've known.

Practical Tips

Forming external bends with Wiremold 2000 and 2200

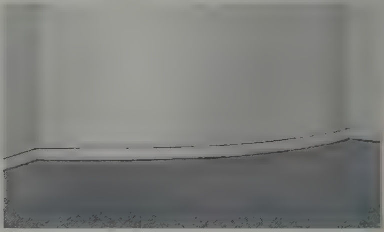
Experiments conducted by Wiremold engineers indicate that the minimum practical radius to which Wiremold 2000 and 2200 can be bent is 3 feet, for both external and internal bends.

External bends of greater than 3-ft. radius can be done on the job by using the contour of the structure as the form to which the raceway is to be bent.

The base should be securely attached at one end in such a manner that it will withstand the leverage of the initial bend; after the first bend, leverage on the fastening diminishes appreciably. Starting at the attached end, pressure should be applied at short intervals, working toward the opposite end.

The cover may be formed fairly easily by again starting at one end, with the cover just in the base and held or fastened in that position, and working toward the other end.

(The forming of internal bends will be discussed in the next issue.)



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All WIREMOLD products are sold through electrical distributors — your best source for all electrical products.

Advertisement

This ballast location saves you money!

Why does Wide-Lite put the ballast *behind* the floodlight, in a ballast box that doubles as a mast fitter?

Because this location saves you time, trouble, and money.

It saves you time because you simply slip the mastfitter over any standard 2-inch pipe mast to mount both ballast and fixture.

It saves you money because you eliminate the mounting and wiring of remote ballasts.

It saves you trouble, and money, because the lamp and ballast are far enough apart that heat from each one can be disposed of separately. If they were in the same housing, or if they were touching, the combined heat would cut the life of both ballast and lamp. And when a mercury vapor lamp runs too hot, it loses its proper color correction characteristics. So we house our ballasts in a die-cast aluminum enclosure that's weatherproof. Ballast heat and lamp heat are sent their separate ways through separate sets of fins.

Naturally we make remote-ballast units for situations that require them. But most engineers specify our combination ballast box and mast fitter to save time, trouble, and money.

Want more reasons why Wide-Lite units save money? Write Wide-Lite Corporation, Division of Esquire, Inc., Dept YA111, 4114 Gulf Freeway, Houston, Texas.

WIDE-LITE

HIGH EFFICIENCY FLOODLIGHTS

It moves

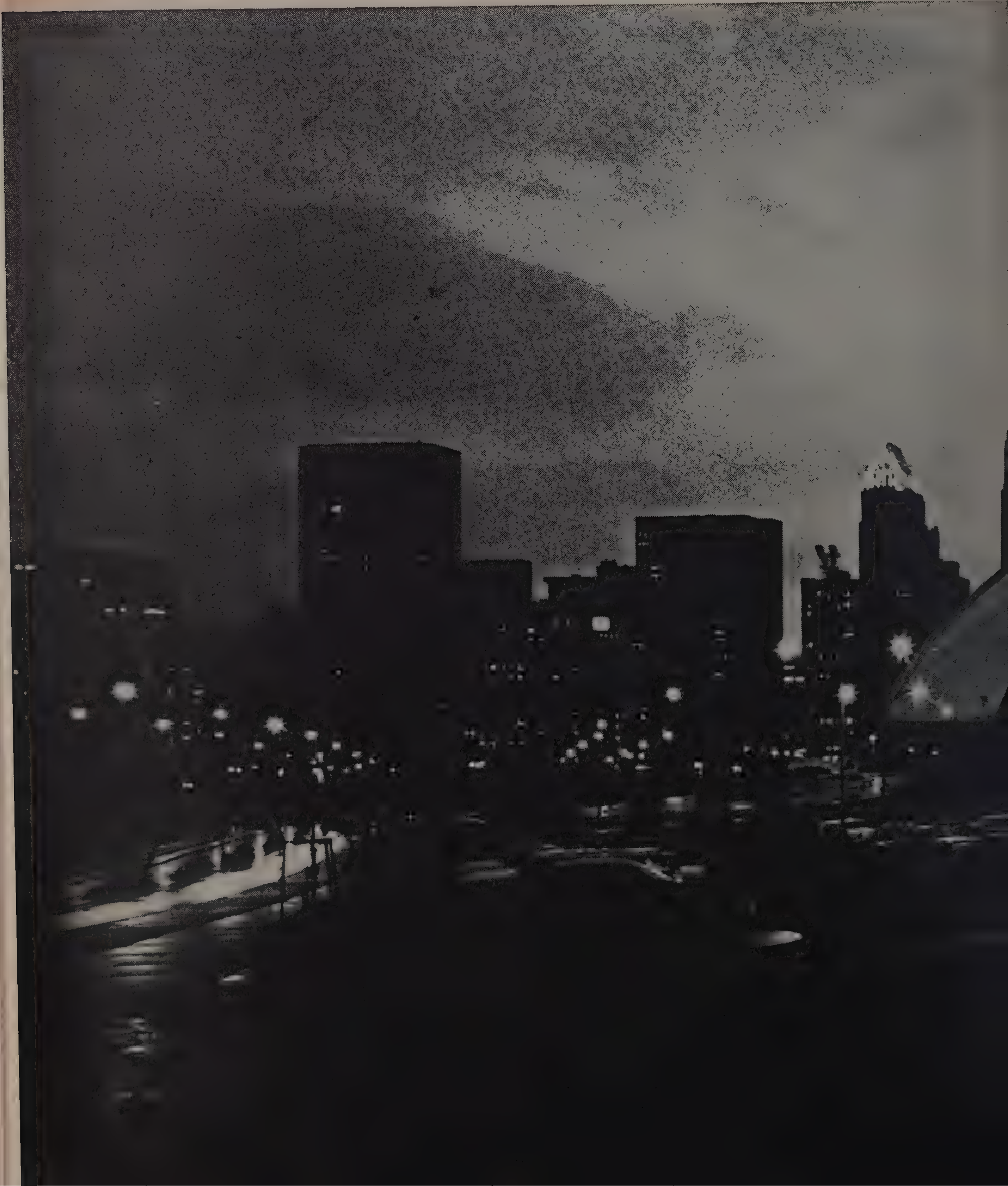
. . . powered and controlled by Westinghouse

Press a button—an indoor auditorium becomes an open ai stadium in 2½ minutes—and behind that button is an unparalleled story of engineering and construction cooperation

Architectural and engineering teamwork has given Pittsburgh the world's first movable roof auditorium. Th versatile structure adds to the city's renaissance, in on building, a 14,000 seat sports arena, a convention hal open air amphitheater, and an exhibit center. Westinghous products bring the facilities to life, give precision control f the delicate manipulation of six 300-ton movable leaves.

Outwardly, the new auditorium is a 400′ stainless ste

J-9417



mbrella, suspended from a space frame cantilevered from he ground. That is one outstanding construction teamwork story.

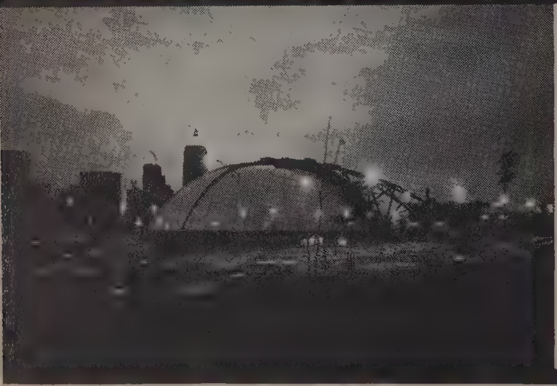
Inside, coordination culminates in a control console ocated high above the seating area. From this station the

onstruction Motivators: The Authority & Industry
to r seated: Judge A. L. Wolk, Vice Chmn.; N. Stabile, Sec'ry Treas.; W. B. McFall, Chairman; H. R. Edelman, Jr., Pres. Heyl & Patterson; nd D. J. McDonald, Vice Chmn.
tanding: C. B. Jansen, Member; J. E. Payne, V. P. Westinghouse; and Edw. Fraher, Exec. Director

J-94176.2

The six movable roof leaves are driven by Westinghouse right angle gearmotors, five to each leaf. Photo shows base of one of the movable leaves with the acoustic ceiling panels removed.

O. M. Newman, Heyl & Patterson, and Edward Cohen, Amman & Whitney, discuss roof electrical drive with C. G. Falkenstein, West inghouse, kneeling in front of main roof reactor control cabinet.

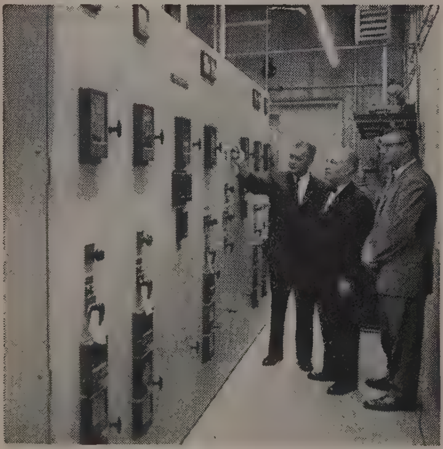


unique movable roof drive system is activated. An A reactor control scheme keeps all six movable leaves in ste throughout open and close cycles. Each leaf is driven b Westinghouse Moduline® gearmotors, with opposite leave being operated in pairs.

Close cooperation among architects, engineers, owner contractors and Westinghouse helped to provide a syste flexible enough to serve varying building demands, wit the high degree of electrical reliability required.

For more complete information on the electrical aspect of construction, write to: Westinghouse, P. O. Box 86 Pittsburgh 30, Pennsylvania.

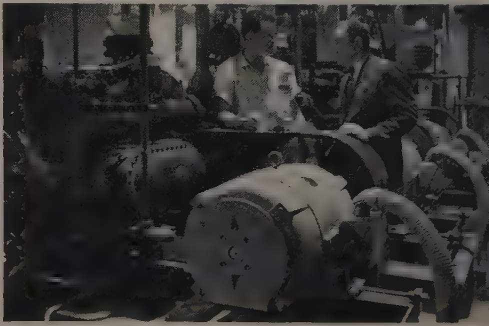
J-94176.



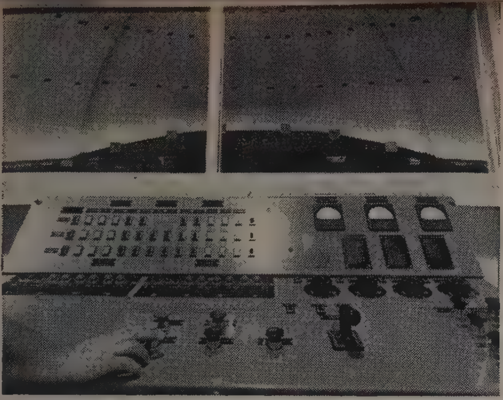
5KV metal-clad switchgear contains a tie-breaker to provide emergency switching between two incoming 4160-V lines. Seen here: N. J. Grady, V. P., Ernst, C. J. Long, and A. B. Janaszek.

Checking construction progress are C. J. Long and F. J. Sarkna Westinghouse. In background, 1500 kva power center supplies powe for building auxiliary and air conditioning compressor motors.

Westinghouse Motor Control Center located in the Mechanical Room centralizes auxiliary motor controls. Discussing installation advantages are H. R. Helvenston, C. J. Long and N. J. Grady.



Three 125 hp Lifeline A motors drive freon compresso to chill brine supply for ice rink piping. Seen here are F. Schad, Limbach, and C. G. Falkenstein, Westinghou

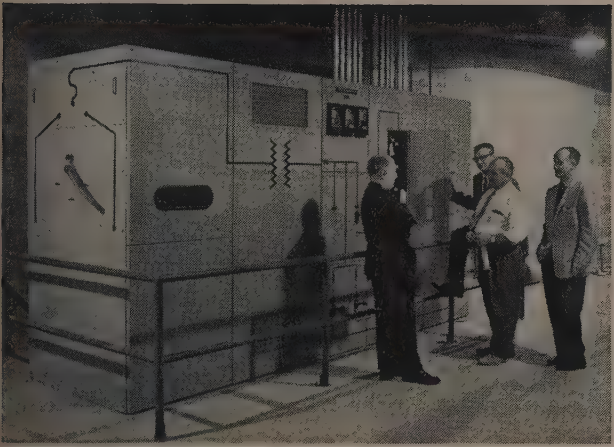


Operator's view from roof control console high above the spectator area. Visible through the glass front is the juncture of the first two movable leaves of the roof.

One of main power transformers rated 2500 kva at 11.6 kv to 4160 volts. Discussing the power supply are C. J. Long, Electrical Engineer, M. A. Geffel, Ernst, and A. B. Janaszek, Westinghouse.

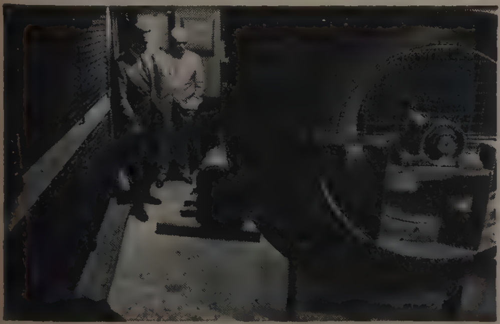
Builder: Public Auditorium Authority of Pittsburgh & Allegheny County: *Resident Engineer & Supt. of Construction:* H. Rey Helvenston
Architects: Mitchell & Ritchey, Pittsburgh
Roof Designers & Engineers: Ammann & Whitney, N.Y.
Electrical Engineer: Carl J. Long & Associates, Pittsburgh
Mechanical Engineer: John Mullin & Associates, Pittsburgh
General Contractor: Dick Corporation, Large, Pa.
Electrical Contractor: E. C. Ernst, Inc., Pittsburgh
Mechanical Contractor: Limbach Company, Pittsburgh
Drive System Contractor: Heyl & Patterson, Inc., Pittsburgh

Westinghouse

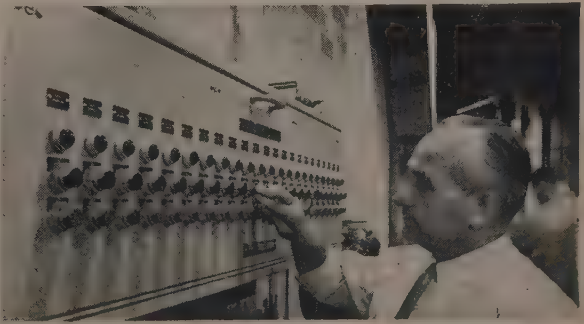


Another Westinghouse power center, this 300 kva ASL dry type supplies lighting and auxiliary power. Discussing its component parts are C. J. Long, A. B. Janaszek, M. A. Geffel and Albert Simon, Ernst.

Type M Electric Stairway transports 8,000 persons /hr. Top to bottom: E. R. Gallagher, supervising architect; H. R. Helvenston, resident engineer; and A. Simmonds, Westinghouse Elevator.

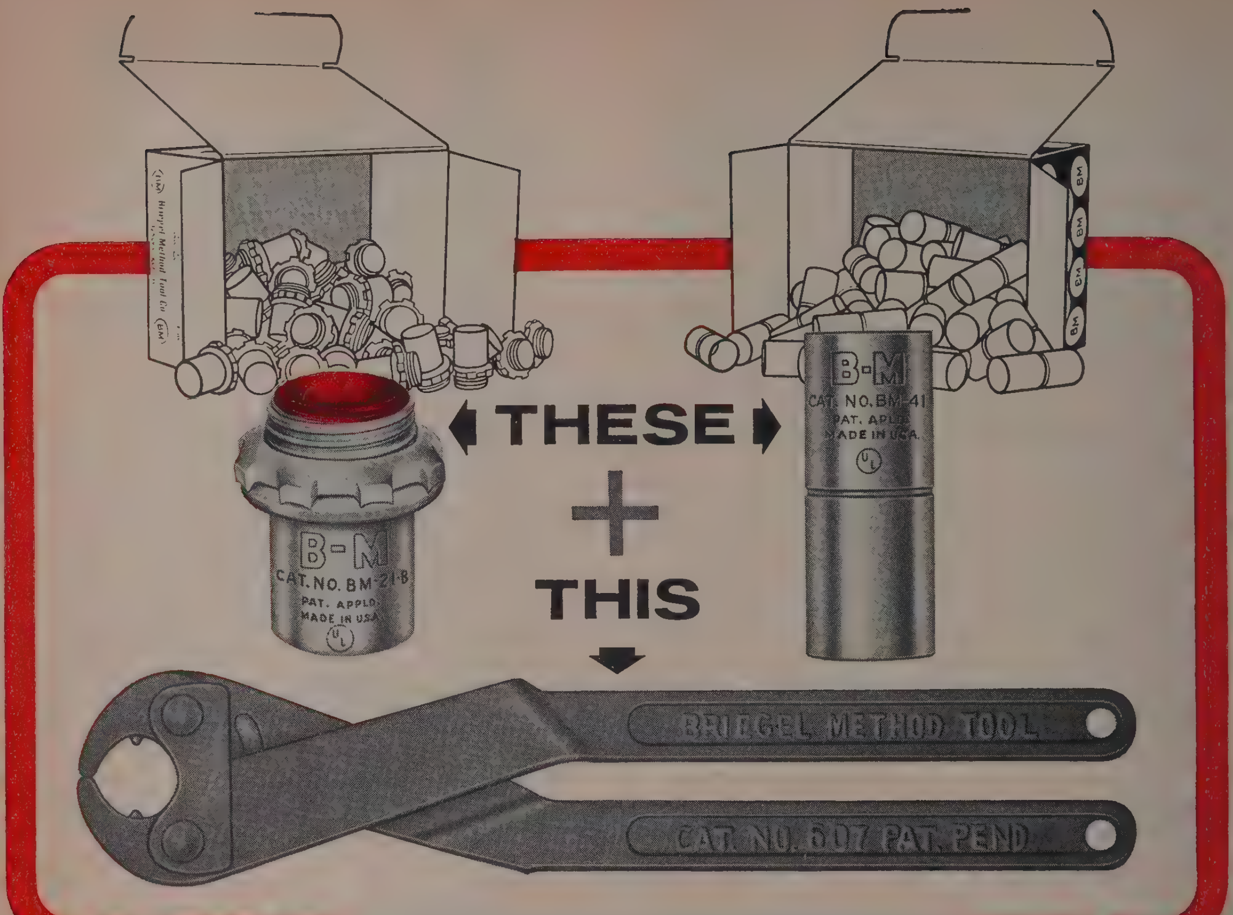


Fan room equipped with series 8000 Air-Foil centrifugal fan and air conditioning coils. W. Y. Humphreys, Westinghouse, with John Mullin, Consulting Engineer, air conditioning and ventilation system designer.

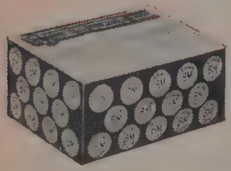


Westinghouse mercury vapor parking area and floodlighting are operated from this remote control panel located in the mechanical room. M. A. Geffel, Ernst, tests lighting circuits.

J-94176-4



are what you need to do the job Easier... Faster...Better and get more profits too!



● Here is the combination that is unbeatable when it comes to easier E. M. T. installation at less cost. New lightweight plier size indenters make setting up thin wall conduit a breeze. B-M fittings are neater too! No unsightly nuts or projecting set screws. B-M, the Original Indenter Fittings used with B-M Indenter tools, give you the best, most permanent ½″, ¾″ and 1″ E. M. T. installations possible.

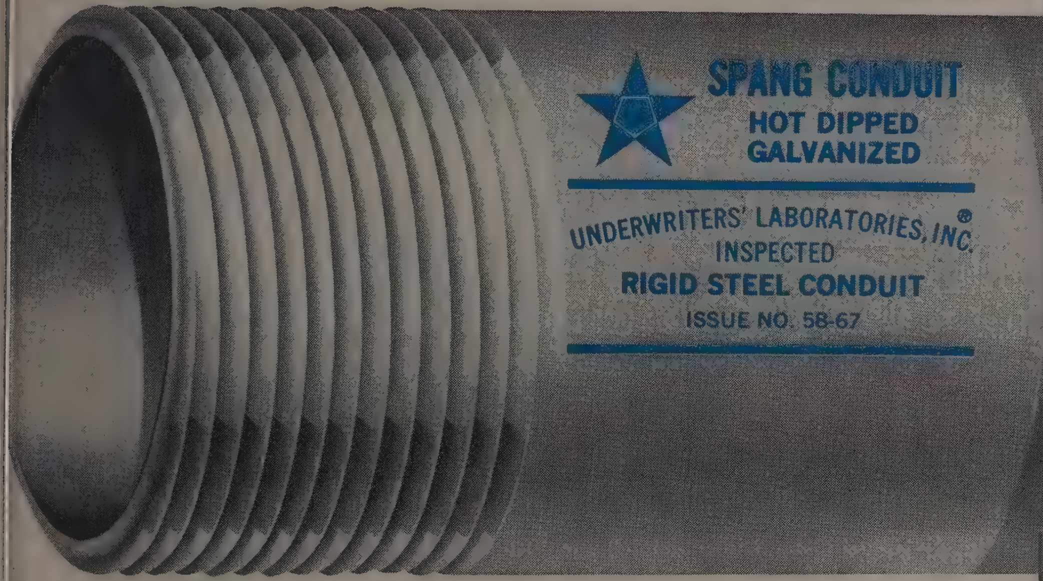
A few more of the plus features of B-M fittings are Concrete tight—Vibration resistant—Extra heavy bright zinc plate, salt spray and acid drip tested for corrosion resistance—Extra heavy positive bonding locknuts—smooth rounded edges or bushed throat type connectors that prevent insulation damage—All steel construction with extra heavy gauge wall thickness.

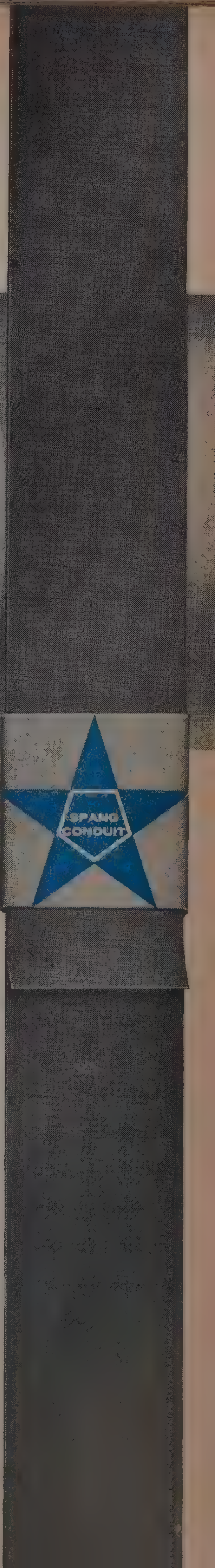
BRIEGEL METHOD TOOL CO.
GALVA, ILLINOIS

All B-M Indenter type fittings far exceed the requirements of U. L. file card E 10863 and Federal Specifications W-F-406.

USED THE MOST FROM COAST TO COAST

look for this marking...





...and this tag

on every bundle

Your assurance of top protection against corrosion... of faster and better conduit installations

The new SPANG Blue Star Galvanized Rigid Steel Conduit now has the regular hot-dipped galvanized coating *plus* a second galvanized coating for extra protection against corrosion!

Threads are uniformly galvanized on every ridge and valley for easy coupling. No excess zinc to chase off . . . no bare spots. It's the best thread protection available against corrosion.

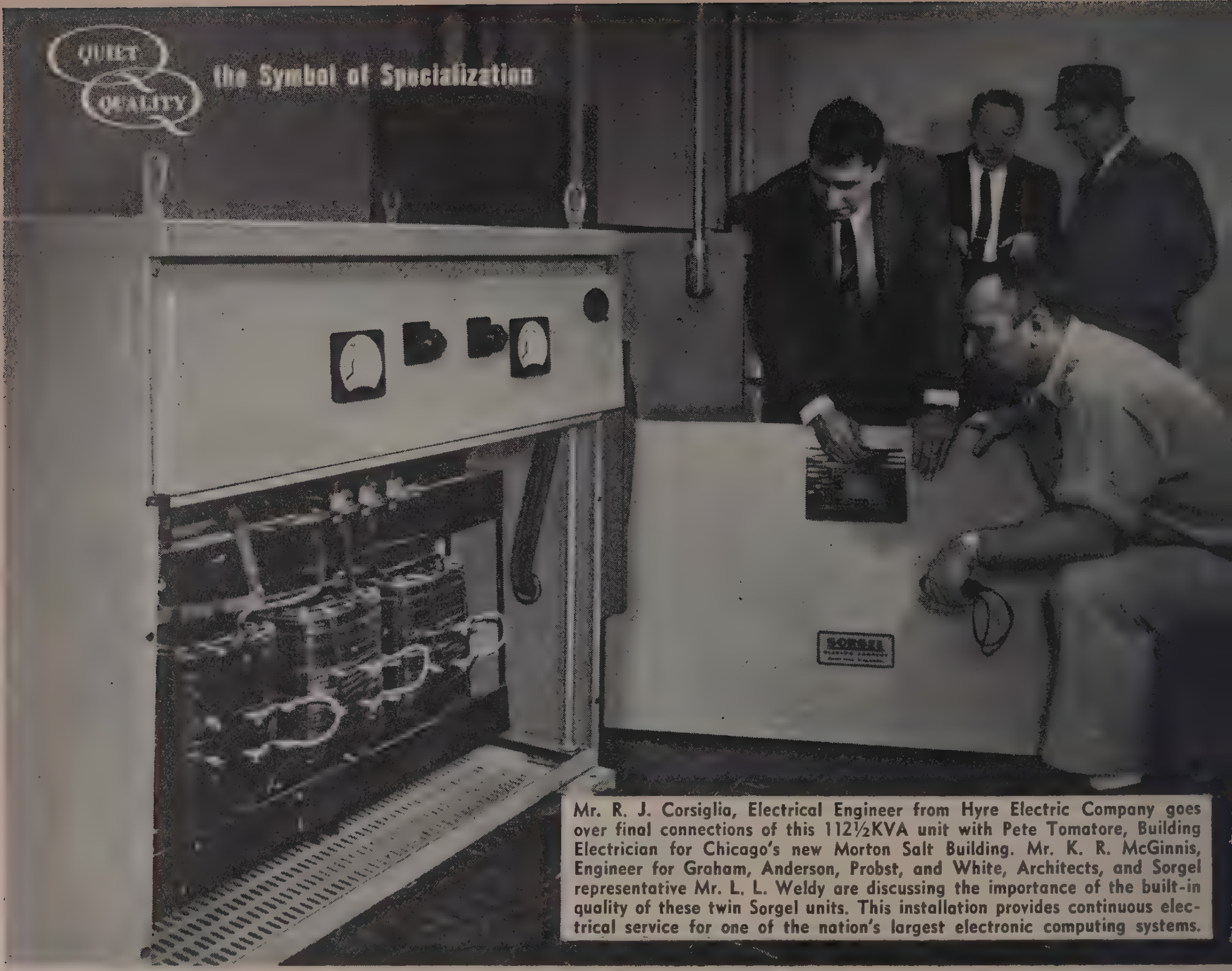
Double coating on the conduit inhibits rust formation. Finish won't flake off. Provides fine appearance in exposed locations.

Easier handling, too. SPANG Blue Star Conduit is bundled with steel strapping in sizes up through 1½". Shipped in one-ton lifts for fast handling by lift truck, easy inventory.

You owe it to yourself to try new SPANG Blue Star Conduit. Get complete details from your nearby SPANG Distributor.

SPANG Blue Star Conduit is one of the many fine products produced by *National Supply Division, Armco Steel Corporation, Two Gateway Center, Pittsburgh 22, Pennsylvania.*

ARMCO National Supply Division

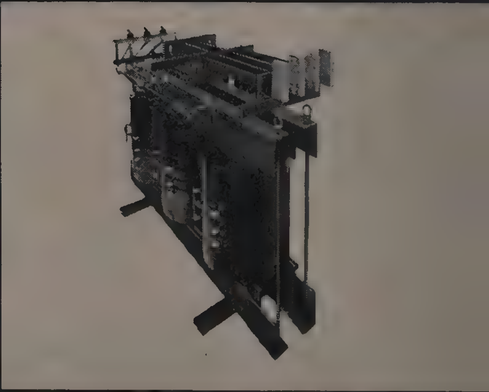


Mr. R. J. Corsiglia, Electrical Engineer from Hyre Electric Company goes over final connections of this 112½KVA unit with Pete Tomatore, Building Electrician for Chicago's new Morton Salt Building. Mr. K. R. McGinnis, Engineer for Graham, Anderson, Probst, and White, Architects, and Sorgel representative Mr. L. L. Weldy are discussing the importance of the built-in quality of these twin Sorgel units. This installation provides continuous electrical service for one of the nation's largest electronic computing systems.

SORGEL HAS A DRY-TYPE

1/4 KVA TO 10,000 KVA, ALL STANDARD AND INTERMEDIATE VOLTAGES UP TO 15,000 VOLTS

Popular sizes up to 75 KVA, both single and 3 phase transformers, are normally in factory stock. They are also constructed to be interchangeable for wall or floor mounting.



The transformer is the heart of your entire electrical system. Here is where true quality gives you dependability and low cost operation. Illustrated is a 500 KVA, 5 KV class, for a Sorgel unit substation.

If you BUY, SPECIFY or INSTALL transformers, YOU SHOULD KNOW THESE IMPORTANT FACTS

Here Are Eight Sorgel Customer Benefits That Mean Positive Savings in Dollars

These engineered advantages show why Sorgel dry-type transformers are considered the finest in the electrical field. These quality features, and many others, assure you of economy in installation and operation.

- All coils have end filler protection in each layer to prevent movement of conductors under heavy loads and short circuit stress conditions.
- The transformer core and coil unit is specifically designed for low sound level. In units 15 KVA and larger, the core and coils are mounted on vibration dampening pads designed to suppress transmission of vibration to adjacent areas.
- Each unit is completely assembled, wired, and tested at the factory, ready for line and load connections eliminating any job-site assembly.
- All terminations are securely anchored, and solderless connectors are furnished on all transformers with terminal boards. Vacuum impregnated windings are brazed to the terminals.
- Connection covers are cushioned and easily removed by means of two captive bolts on small sizes, and four on larger sizes.
- Ventilating openings are designed to prevent accidental access to live terminal parts. Expanded metal is not used on sides, back or front.
- In Quiet-Quality units, performance data, such as core loss, copper loss, sound level, etc., is always equal to, or lower than, the guaranteed values submitted to the customer.
- Sorgel units are individually tested in accordance with NEMA standards. Certified tests are furnished upon request, to further substantiate the guaranteed data.

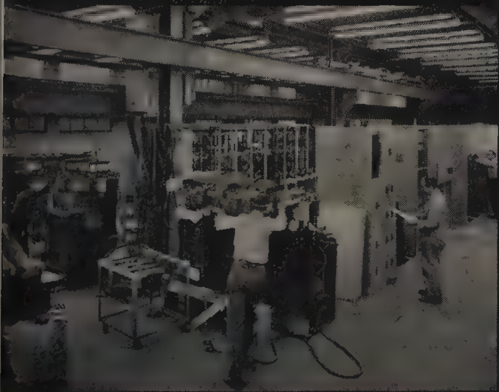
Contact your nearest Sorgel Sales Engineer for additional reasons why Sorgel units are truly your most economical buy - as quality pays, it doesn't cost.

SORGEL
SOUND-RATED DRY-TYPE
TRANSFORMERS

SORGEL ELECTRIC COMPANY

Since 1916 the pioneer in the development, manufacturing
and application of sound-rated dry-type transformers
836 WEST NATIONAL AVENUE • MILWAUKEE 4, WIS.
Experienced sales engineers in principal cities

TRANSFORMER FOR YOUR EVERY NEED



CLIP AND MAIL FOR TECHNICAL BULLETINS.

☐ 611—Transformer Line
☐ 960—Substations
☐ 658—DC Saturable Reactors

Name____________________

Title____________________

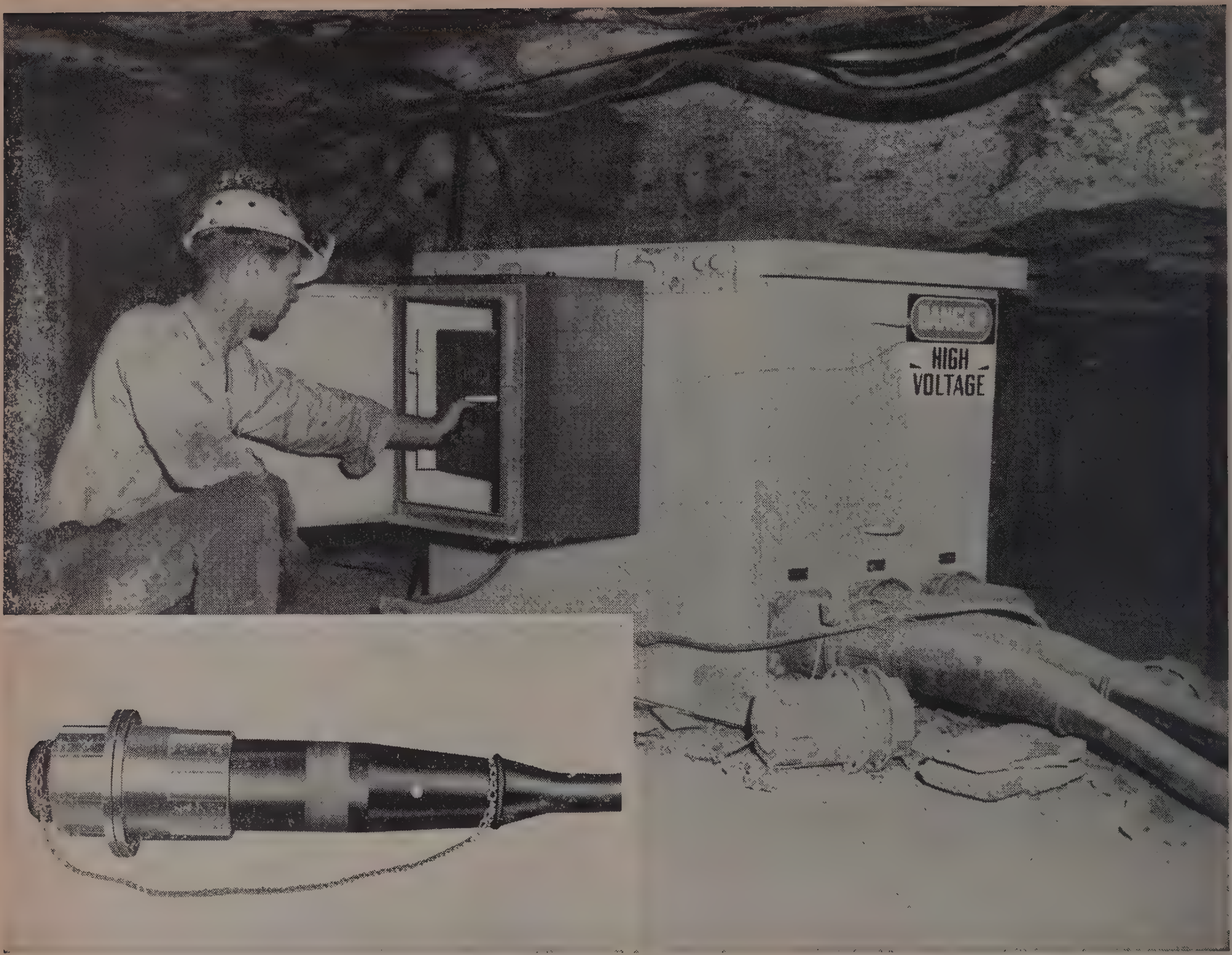
Address____________________

City____________________

State____________________

All units are built to meet or exceed latest standards of ASA, NEMA and AIEE. Sorgel provides the most liberal designs and a coordinated system of either Class B, F or H insulation with the most effective use of quality materials to assure continuity of service.

Sorgel is the leading manufacturer of quality Saturable Reactors used to regulate and control electric power for various manufacturing processes. Special features are: unusual wide control range, low D.C. requirements, low cost operation. Illustrated is a 150 Kva Reactor with recording and indicating instruments for automatic control.



Cable connectors molded of HYPALON synthetic rubber are becoming key elements in modern high-voltage power systems. After two years' field use, electrical engineers report not one breakdown due to corona attack.

New HYPALON® cable connectors defy corona at 7500 volts

Higher-voltage portable equipment for plants and mines . . . and the resulting increase in corona discharge . . . prompted development of this new HYPALON cable connector that is virtually corona-*proof*. Rated at 7500 volts, the unit is the result of five years' research by Joy Manufacturing Co., St. Louis, Mo. Du Pont HYPALON proved to be the only covering material that met the stringent operating requirements of this high-voltage connector.

Corona resistance is just *one* of the properties that makes HYPALON well suited to many types of electrical applications. Industrial users have long relied upon the ozone immunity of HYPALON, its resistance to heat, flame, factory fumes, chemicals.

Users of triplex cable find colored HYPALON jacketing and insulation permits rapid phase identification and provides better sunlight, weather and abrasion resistance than conventional jacketing materials. And because HYPALON synthetic rubber is a *vulcanized* jacketing material, there's no problem with hot or cold flow.

Investigate the unusual properties of Du Pont HYPALON. Learn how it can improve jacketing and insulation performance in your operation. Write: E. I. du Pont de Nemours & Co. (Inc.), Elastomer Chemicals Dept. ECM-12, Wilmington 98, Delaware.

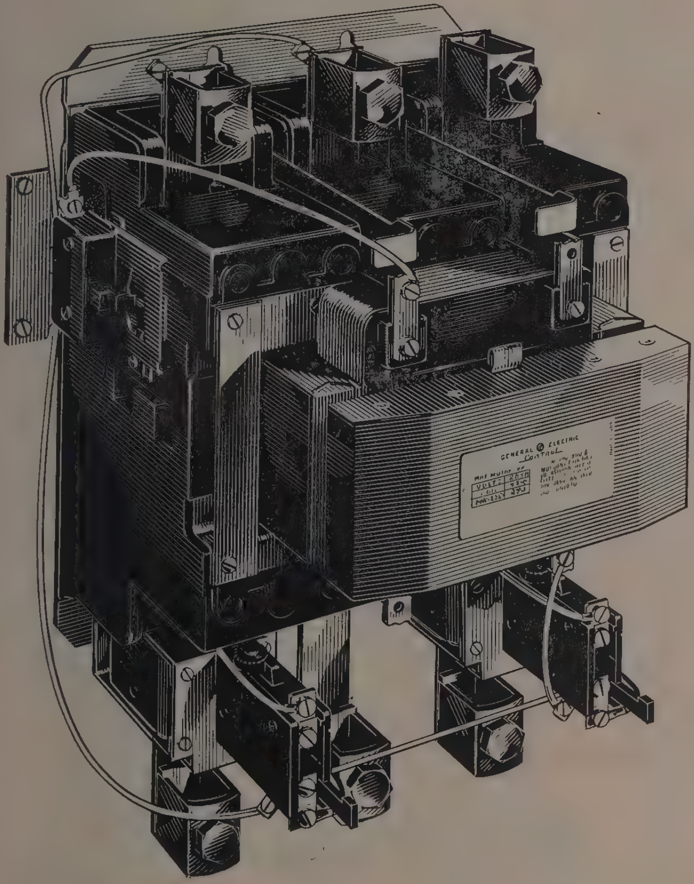
DU PONT
REG. U. S. PAT. OFF.

HYPALON®
SYNTHETIC RUBBER

Better Things for Better Living . . . *through Chemistry*

THE NEWEST STARTER FROM GENERAL ELECTRIC

. . . and what it means to you



IMPORTANT
SIZE 5 DIMENSIONS REDUCED EVEN FURTHER!

NEW NEMA SIZE 5 STARTERS now added to G-E 100-Line feature extremely small size, plus all 100-Line benefits: Height—14¼"; Width—~~11¾"~~ 11½" Area—~~167.4~~ 163.8 sq in.

NEMA SIZE 00	NEMA SIZE 0	NEMA SIZE 1	NEMA SIZE 2	NEMA SIZE 3	NEMA SIZE 4
H-4 1/2"	H-4 1/2"	H-4 1/2"	H-6 5/8"	H-9 5/16"	H-9 13/16"
W-5 3/32"	W-5 3/32"	W-5 3/32"	W-6 1/4"	W-8 3/4"	W-8 3/4"
A-22.9 sq in.	A-22.9 sq in.	A-22.9 sq in.	A-41.4 sq in.	A-81.4 sq in.	A-85.8 sq in.

Progress Is Our Most Important Product

GENERAL ELECTRIC

6 DISTINCT ADVANTAGES YOU CAN'T GET ELSEWHERE

General Electric announces the development o new NEMA Size 5 magnetic starters and contactors—up to 65 percent smaller in open form than previous designs.

This addition to the G-E 100-Line Starte "family" means you can now get seven sizes tha give you six distinct, measurable advantages yo cannot get from any other single brand of moto control. They are:

1. **SMALLER SIZE**—particularly in the more popular forms (Sizes 0 and 1). On larger forms reduced height (as much as 41 percent on Siz 5 units alone) saves critical panel space. Se dimensions at left below.
2. **EASE OF WIRING**—all terminals are "ou front," visible and accessible. Wiring for al sizes is straight through (this can save up t $8 in wire alone for Size 5 installations wher line leads come in top and out bottom).
3. **SIMPLIFIED MAINTENANCE AND INSPECTION**— contacts can be inspected or coils changed i less than a minute on all sizes. No tools required on Sizes 00 through 4; only a screwdriver on Size 5.
4. **MORE MODIFICATION KITS**—industry's mos complete line lets you modify existing starter on-the-spot in minutes to meet special operating conditions. Result: reduced change-ove expense. All starter enclosures have cove knockouts for field-addition of push buttons selector switches, and indicating lights. Othe kits include auxiliary contacts, third overloa relay, fuse clips, and coils.
5. **FIELD-PROVED DESIGN**—well over 1,000,00 units are operating in the field today. Exhaustive testing in laboratories and on custome applications since the 1957 introduction i your assurance of 100-Line dependability.
6. **"FAMILY" DESIGN BENEFITS**—G.E.'s 100-Line offers all forms and sizes in the same basi design. You benefit from common installation procedures; common maintenance and inspection techniques; reduced inventory; and such operating conveniences as adjustable overload relays for all sizes. Mounting dimensions fo Sizes 00, 0, and 1 are identical; so are dimensions for Sizes 3 and 4. Common mounting dimensions and wiring procedures save time and space during panel layout; also when changes occur in horsepower requirements o industry specifications.

Meet all your control requirements—up through 200 hp—with the uniform, field-proved 100-Line, available in all popular forms: Sizes 00, 0, 1, 2, 3, 4, and 5 contactors and starters; plus combination starters; reversing and two-speed controllers. Contact your G-E sales engineer or distributor, or write Section 811-29, General Electric Company, Schenectady 5, N. Y.

"I don't know who you are.

I don't know your company.

I don't know your company's product.

I don't know what your company stands for.

I don't know your company's customers.

I don't know your company's record.

I don't know your company's reputation.

Now—what was it you wanted to sell me?"

MORAL:
Sales start before your salesman calls—with business publication advertising.

McGraw-Hill
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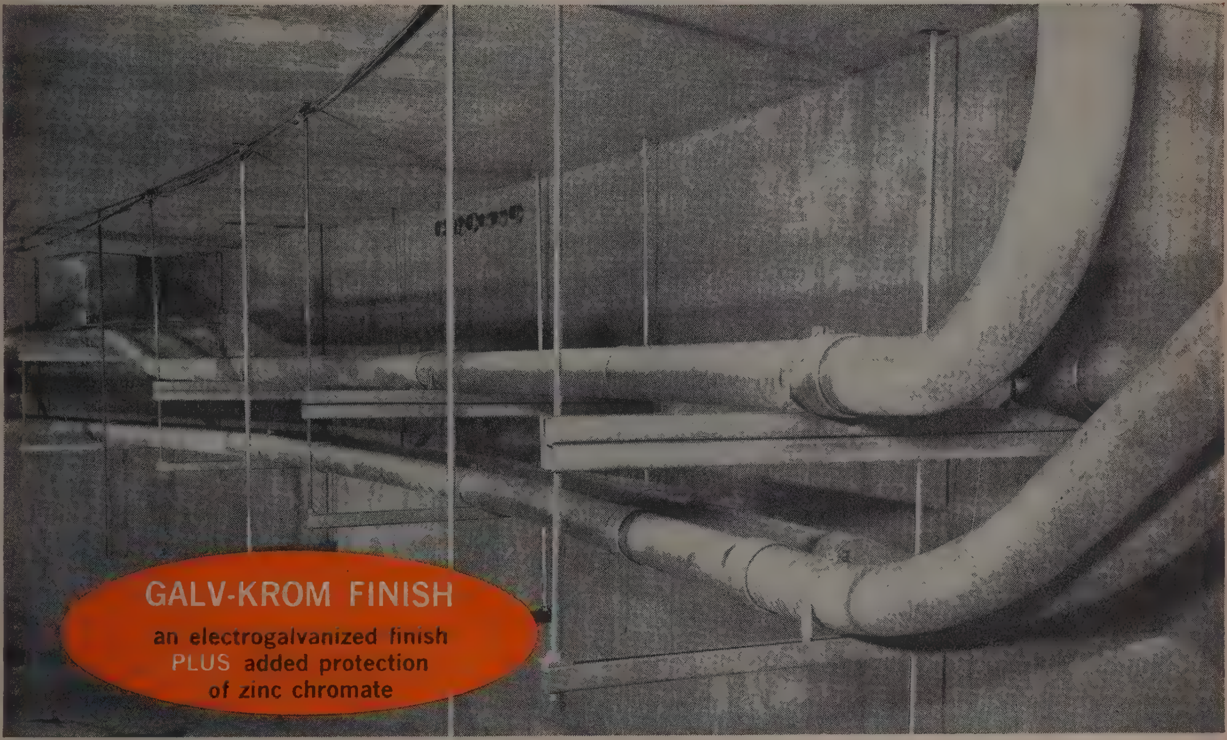
McGRAW-HILL PUBLISHING COMPANY, INC., 330 WEST 42nd STREET, NEW YORK 36, N. Y.

STEEL CITY Hanger Rod

—an integral part of the electrical system



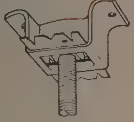
GALV-KROM FINISH

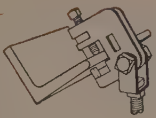
an electrogalvanized finish
PLUS added protection
of zinc chromate

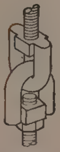
STEEL CITY HANGER ROD HANGS NEARLY EVERYTHING

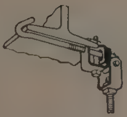
A wide variety of fittings for every type of installation

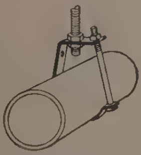
H-195
Steel Rod Coupling

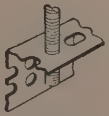

D-255
Concrete Insert

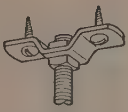

E-232
Clamp with Swing Connector

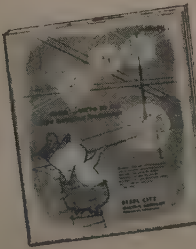

H-260
Swivel Joint


E-165
Adjustable Beam Clamp
with Swing Connector


C-149
Adjustable Conduit
and Pipe Hanger


With Steel City
Slotted Angle


E-243
Ceiling Flange



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hanging problem?

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BULLETIN PH-1

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Threads are:

- **FREE RUNNING**—*Clean, Uniform*
- **RUST PROOF**—*No Paint Required*
- **BURR FREE**—*Smooth Finish*

ALL-PURPOSE HANGER RODS

72″ Lengths
Continuous Threads
¼″, ⅜″, ½″ and ⅝″ Diameters

LONG-THREADED RODS

Lengths 2″ through 18″ —
Continuous Threads
Lengths 24″ through 72″ —
Threaded 4″ one end and 10″ other end
⅜″ and ½″ Diameters

STEEL CITY ELECTRIC COMPANY
Subsidiary of American Marietta Company
PITTSBURGH 33, PA.

Cable's best friend

General Electric silicone rubber insulation protects against heat, overloads, ozone, aging, moisture and radiation

Double Capacity, Overload Protection — When used to insulate cable, silicone rubber gives you up to *twice* the current capacity, *twice* the overload protection as ordinary insulation. The superior electrical properties and wide operating temperature range of silicone rubber are the reasons.

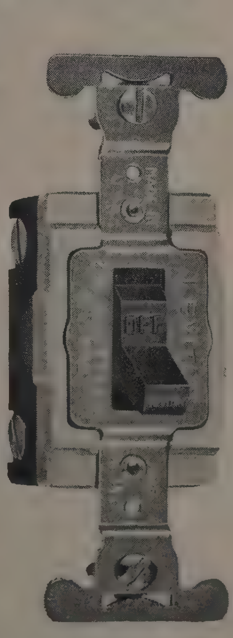
Greater Reliability, Longer Life — G-E silicone rubber insulation has long service life at temperatures from −55°C to 200°C, and it is virtually ageless under severe conditions of heat, ozone, sub-freezing, moisture, and radiation. Trust it to keep working long after ordinary insulation fails.

Possible Cost Savings! What's the price difference? More often than not, *none at all.* In old installations, use it in *existing* conduits. Capacity and protection goes up, costs go down. On new installations, you are buying the extra capacity and overload protection needed in the years ahead. Sound electrical insurance.

Get the full story on cable's best friend: silicone rubber. Write: General Electric Company, Silicone Products Dept., Section DD1260, Waterford, New York.

GENERAL ELECTRIC

Testing a Leviton switch subjects it to the equivalent of 20 years of heavy usage. It goes on and off 30,100 times under 4 types of loads. Periodic destructive tests go up to 3,000,000 cycles to check reliability. 17 separate laboratory tests evaluate both the finished switch and all its components. Leviton maintains one of the largest wiring device testing labs in the country to bring you the safest possible switch at the lowest possible price.



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Chicago ▪ Los Angeles ▪ Montreal, Canada

Contact AMERICAN INSULATED WIRE CORP.,
Pawtucket, Rhode Island, A Leviton subsidiary,
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Catalog #5521
Quiet Switch 20A.277V. A.C. only
Underwriters Laboratories, Inc. Inspected
One of LEVITON's 60 types of switches

Location: Natural Science Building,
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Installed:
5-foot
Westinghouse
plug-in
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bus duct

Two men, a pair of open-end wrenches, a screwdriver and only 7 minutes, 13.2 seconds was all it took to put a 5-foot section of Westinghouse 3-phase, 440 volt, 1600-amp bus duct in service on this job.

New Westinghouse plug-in low impedance bus duct is ideal wherever power is used in commercial, industrial and institutional buildings. Factory-installed joint hardware and plug-in power take-offs simplify the entire installation and reduce cost.

J-30332

Time:
7 minutes,
13.2 seconds

In addition, it's completely salvable, compact and neat in appearance.

To figure jobs with the sharpest pencil, to complete a quality installation at top speed, contact your Westinghouse sales representative about new Westinghouse plug-in low impedance bus duct. Or, write: Westinghouse Electric Corporation, Standard Control Division, Beaver, Pa.

Westinghouse

NEW! Honeywell Line-Voltage Thermostats with higher ratings, new accuracy, new beauty

HEAVY DUTY T473 (four versions). For heating, cooling, and heating-cooling. 16 amps at 120 volts for heating or cooling models. 16 amps for heating—8 amps for cooling on combination models. Subbases available for manual switching.

New Fan-Coil Thermostat. **LIGHT DUTY T651 SPDT** for heating/cooling applications. Rated at 6 amps at 120 volts for both heating and cooling. Ideal for use on fan coil units when used with the Q473 subbase which provides manual selection of heat-off-cool.

EASIER TO SELL

Your customers will immediately recognize the name Honeywell. It's a name that is already pre-sold, needs no introduction.

EASIER TO INSTALL

Honeywell engineered to make installation simple, fast, more profitable.

REDUCES COSTLY CALL BACKS

Extensive pre-testing and Honeywell precision engineering assure quality and dependability . . . fewer profit-draining service calls.

Now Honeywell helps you do an even better job on your commercial installations.

The new line of Honeywell Line-Voltage Thermostats is even more dependable, versatile and accurate than before.

Handsome new exterior design blends with any decor. Big numerals and new faces make reading and setting easier.

Higher electrical ratings let you meet any specification—heavy or light load. And Honeywell's famous bi-metal thermometer gives your customers closer, more accurate temperature control.

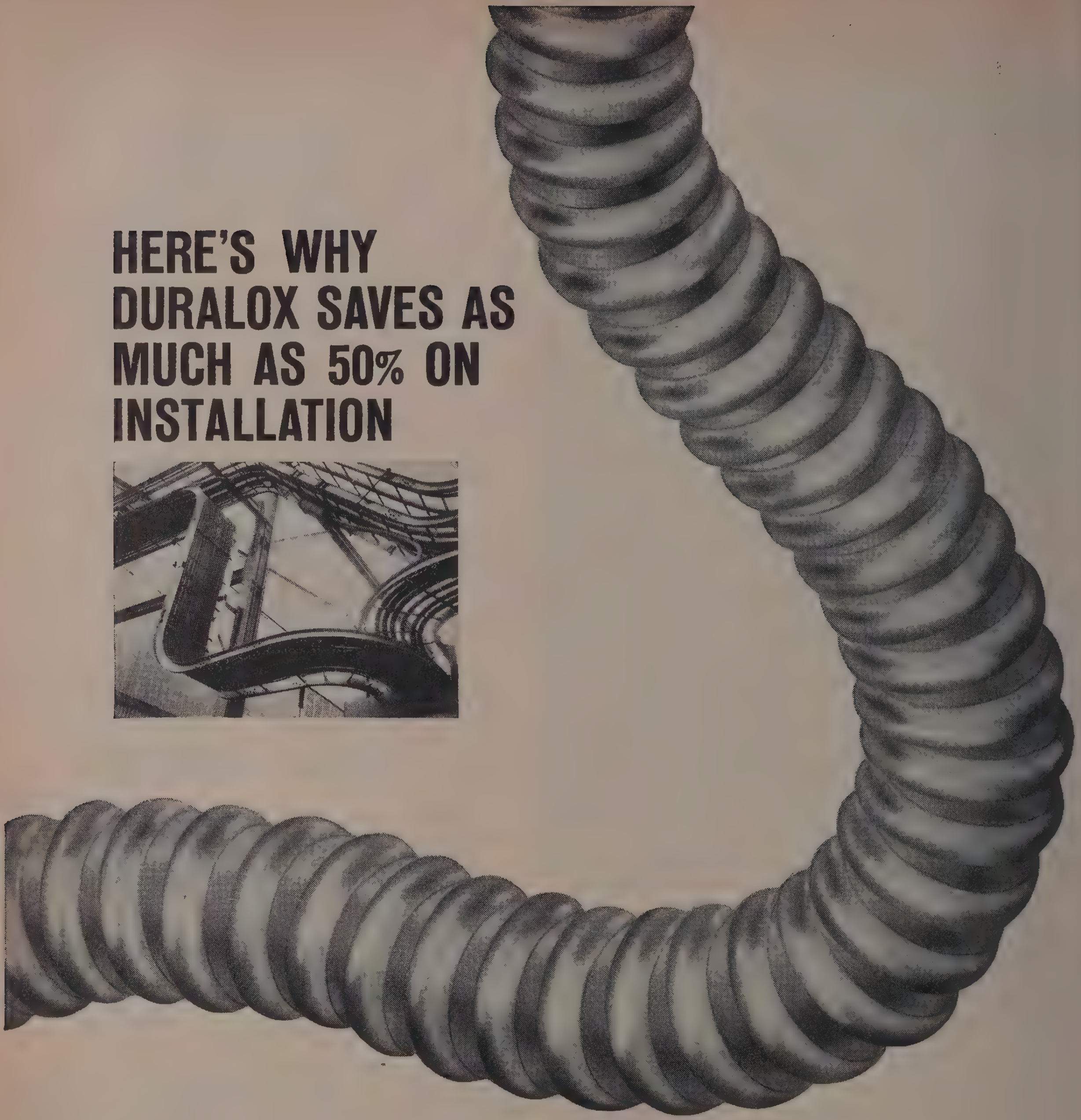
See your wholesaler for complete information on the new Line-Voltage Thermostats, or call your nearby Honeywell office or write:
Honeywell, Dept. EM-12, Minneapolis 8, Minnesota.

Honeywell

H HONEYWELL *First in Control*

HONEYWELL INTERNATIONAL. Sales and service offices in all principal cities of the free world. Manufacturing in the United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.

HERE'S WHY DURALOX SAVES AS MUCH AS 50% ON INSTALLATION



Duralox* needs no conduit—saves time, money, manpower. Duralox is already enclosed in durable, yet flexible, metal armor. Thus, it can be installed *without* conduit—in long runs over and around obstructions, in trays, indoors or out.

You're in—and out—of plants quicker. Make the most efficient use of available manpower.

For your clients—Duralox is easily moved and 100% salvageable—makes their entire plant operation more flexible—a valuable selling plus for you.

And Duralox's lower reactance in higher voltages—because of the close spacing of conductors—results in reduced voltage drop and more efficient power distribution.

Anaconda Duralox Cable is available in all popular sizes and voltages—copper or aluminum conductors with rubber, plastic or varnished-cloth insulation.

Talk to the Man from Anaconda about Duralox for *your* future jobs.

For full information on Anaconda Duralox Cable, write for Bulletin DM 5606 to Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York, Dept. **EFL-1-ECM.**

*Reg. U. S. Pat. Off. 61261C

Duralox has Anaconda Butyl (AB) rubber insulation
for
- extra-high resistance against ozone
- exceptional moisture resistance
- 22% more current-carrying capacity than 70° centigrade insulation

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ANACONDA®
FOR BUTYL-INSULATED
DURALOX POWER CABLE

Chosen to protect your children

. . . a prime essential to all business construction

Chances are great that you pass a Gamewell fire alarm box on your way to work, because a vast majority of all municipal fire alarm systems are Gamewell systems!

For over 100 years Gamewell fire alarm boxes have stood as silent sentinels in thousands of communities. The lives and the property these systems have saved are testimony of their unerring reliability. Similar Gamewell interior fire alarm systems, with the same high standards and offering the same reliability, can be planned as part of complete plant and institutional fire protection. Safety is everybody's business . . . *our* profession.

Send for your Gamewell Flexalarm catalog with typical fire alarm installations, see how you can plan maximum protection at minimum cost. Write THE GAMEWELL COMPANY, 1324 Chestnut Street, Newton Upper Falls 64, Massachusetts. A Subsidiary of E. W. Bliss Company.

BLISS
Gamewell®
FIRST...WHEN SECONDS COUNT

Marine Towers
Architect: Weinberg & Teare
General Contractor:
Dunlop and Johnston
Electrical Contractor:
Doan Electric Company
Owner: Herbert W. Shepherd,
Dunlop & Johnston Inc.

All five apartment buildings in Cleveland's fabulous Gold Coast feature ELECTRUNITE E.M.T.

(ELECTRICAL METALLIC TUBING)

On the shores of Lake Erie in Lakewood, Ohio, western suburb of Cleveland, a complex of luxury apartments is being constructed to provide the ultimate in apartment living.

In every one of the five buildings completed or under construction, electrical contractors have specified ELECTRUNITE Electrical Metallic Tubing.

Progressive contractors know, and appreciate, the installation savings offered by ELECTRUNITE.

Ductile, even bending ELECTRUNITE with "GUIDE-LINES"® makes possible neat, accurate installations. "INCH-MARKS"® eliminate waste motions. And, ELECTRUNITE can be bent and rebent without splitting.

"INSIDE-KNURLING" with "SILVERSLICK" makes wire pulling up to 37% easier.

Discover for yourself how ELECTRUNITE's exclusive features make installation easier, reduce scrap, let you pocket a profit. You, too, will find "The *Best* Costs *Less* Installed."

ELECTRUNITE E.M.T. INSTALLED ready for concrete pouring on one of Cleveland's luxury Gold Coast Apartments. Tight zinc coating on ELECTRUNITE assures long trouble-free years of service in concrete and exposed installations.

Lake House
Architect: Weinberg & Teare
General Contractor:
Marvin Helf, Inc.
Electrical Contractor:
Doan Electric Company
Owner: Marvin Helf, Inc.

The Berkshire
Architect: Weinberg & Teare
General Contractor:
District Construction Co.
Electrical Contractor:
Polacek Electric Co.
Owner:
Joe Magazine — Washington, D. C.

The Shoreham
Architect: J. Ceruti & Associates
General Contractor:
Gattozzi Construction Corp.
Electrical Contractor:
Doan Electric Company
Owner: Tony V. Gattozzi, E. P. Goulder

Edgewater Towers
Architect: Byrne Organization
General Contractor:
Byrne Construction Co.
Electrical Contractor:
California Electric Co.
Owner: Cliffwood, Inc.

Compatibility and
strength characterize
raceways made of Galvanized Steel

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REPUBLIC HAS THE FEEL FOR MODERN STEEL

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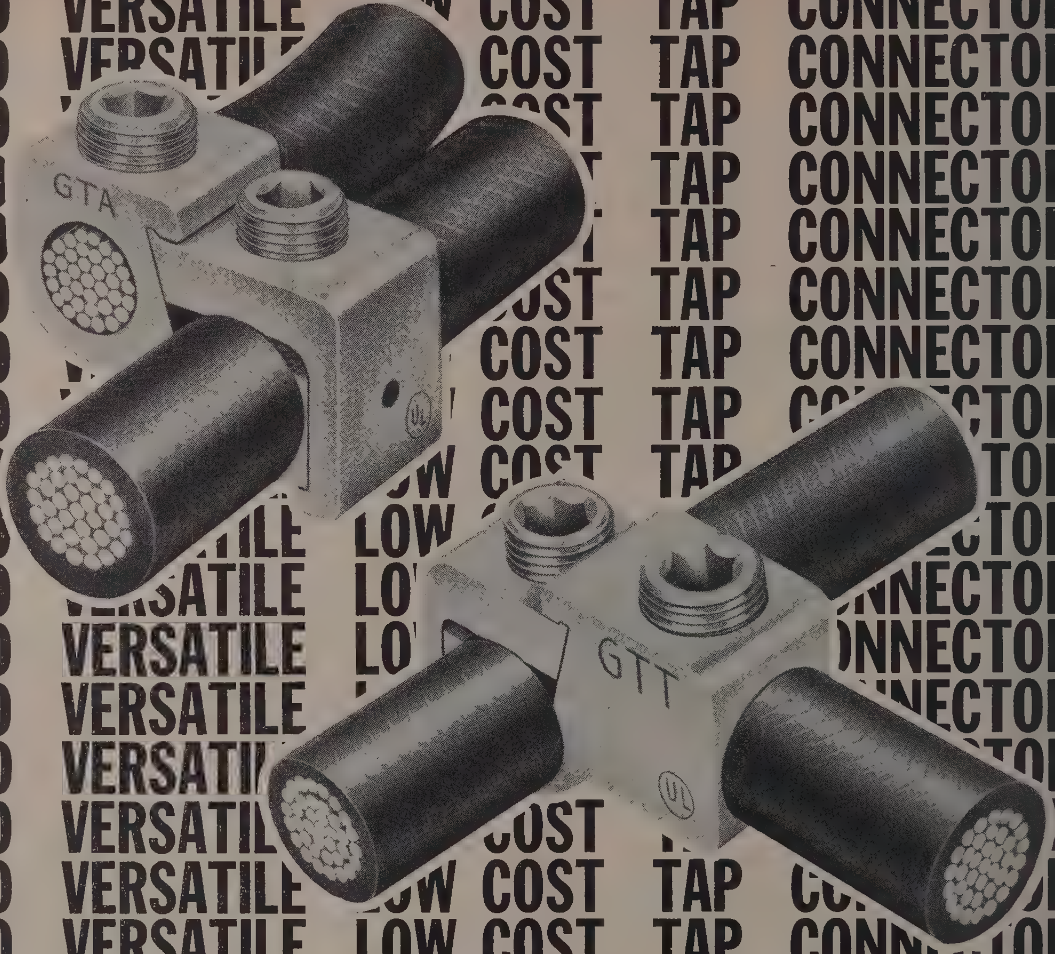
STEEL AND TUBES DIVISION • DEPT. A-2853
212 EAST 131st STREET • CLEVELAND 8, OHIO

Please send more information on the installation advantages of Republic ELECTRUNITE® Electrical Metallic Tubing.

Name____________________Title____________
Company________________________________
Address________________________________
City________________Zone____State__________

ILSCO VERSATILE LOW COST TAP CONNECTORS



patent applied for

TESTED AND APPROVED FOR BOTH COPPER AND ALUMINUM CONDUCTORS

■ **INSTALLATION SIMPLIFIED** simple hand tools, screwdriver or hex wrench only tools needed. 2 sizes of hex wrenches handle entire line. Connections are made individually to main and tap; no need to wrestle two conductors and several clamps at one time. Clamp first on main, then insert tap conductor.

■ **SPACE-SAVING** ideal for junction boxes, or where space is limited. Small, easily taped and insulated.

■ **ELECTRO TIN PLATED** for low contact resistance and protection against galvanic corrosion.

■ **UNIQUE DESIGN** separates tap from main conductor so copper to aluminum connections involve no direct contact of these dissimilar materials.

■ **WIDE RANGE OF WIRE SIZES** only 11 sizes of parallel tap connectors and 10 sizes of Tee connectors cover entire range of #14 to 750MCM conductors in any combination. The only reliable approved aluminum bodied tap connectors available for both copper and aluminum connections.

■ **ONE PIECE ASSEMBLY** 2 piece design uses interlocking parts which lock into one-piece assembly — nothing to get lost.

■ **NO INSULATION INTERFERENCE IN PARALLEL TAP CONNECTORS** Cables spaced with full diameter separation permits main and tap cables to lay parallel in tray, trough or wire way.

■ **STRUCTURALLY STRONG** made from high strength structural aluminum alloy —yield strength 35,000 p.s.i.

WRITE TODAY for catalog—free samples — name of your nearest ILSCO distributor

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CORPORATION
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TERMINAL BLOCKS / STAMPINGS / CONNECTORS / NEUTRAL BARS / FABRICATED TUBES / SOLDERING LUGS / SHADING COILS / WIRE-REINFORCED FUSE CLIPS

PARANITE® CONTROL CABLE

holding the reins
on 670,000 horsepower
at the new
BREED PLANT
Sullivan County, Indiana

owned and operated by
Indiana & Michigan Electric Company
of the American Electric Power System

This new Breed Plant has the generating capacity of half-a-million kilowatts. That's 670,000 horsepower in mechanical energy. PARANITE PVC CONTROL CABLE was ordered to harness this great abundance of energy. It's yet another case history of the nationwide acceptance of Paranite's 72 year record of dependability.

FROM POWER STATION TO CONSUMER

Paranite manufactures a FULL LINE of proven quality wire and cable products. From 600V to 28,000V power cable right down to service entrance and non-metallic sheathed cables you know "*If it's Paranite, it's right*."* All popular sizes of power cable can be ordered directly from stock. Special constructions to meet your exact requirements.

SINCE 1890

PARANITE WIRE & CABLE DIVISION

Essex Wire Corporation, Marion, Indiana
MANUFACTURING PLANTS: Marion, Indiana; Jonesboro, Indiana; Tiffin, Ohio
Sales Offices and Redistribution Warehouses in all Principal Cities.

Sell the Electrical Man
all three parts of him!

The Electrical Man who designs, installs and maintains electrical systems also selects, buys and approves electrical products.

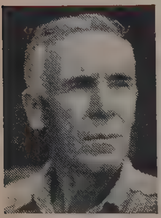
Consulting Electrical Engineer

He is either self-employed, or works for an independent consulting engineering firm, architect, builder or general contractor. He can be in the power sales department of a utility, with the government, or in a federal or municipal inspection department. He must know how to install and maintain a system to design it properly. Even though he performs only one of these three functions, he must know all three well.

Electrical Contractor

He operates an independent enterprise working in commercial, industrial and residential fields. He often employs engineers, estimators, project supervisors, and construction specialists — all in addition to electrical journeymen. He and his men must know all about the problems of designing and maintaining the systems they construct because many times they perform all three of these functions.

Plant Electrical Man



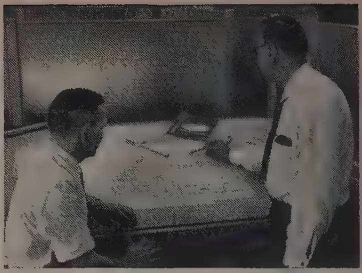
He is a full-time employee concerned with his organization's electrical systems and often responsible for total on-site maintenance as well. He must know all about the problems of designing and installing the system he maintains because many times he performs all three of these functions.

The Electrical Men who design, install and maintain America's electrical systems pay to read . . .

ELECTRICAL CONSTRUCTION AND MAINTENANCE

ABC ABP

A McGRAW-HILL PUBLICATION 330 West 42nd Street, New York 36, N. Y.



Design

The design function and its specifying power is governed by the project requirement plus installation and maintenance considerations. Strong influences are exerted by product performance and reliability as well as the consultant's own awareness of a product's or a brand's existence.

While the contractor's primary concern is installation, he must often design all or part of an electrical system as well. He must have much of the knowledge and skill of a consulting engineer if he does not employ an engineer on his staff. His design is very strongly influenced by maintenance considerations.

The plant electrical man must frequently plan his own electrical systems. His control over an outside consultant's design is significant. He is influenced mainly by product reliability and its economical performance.

ELECTRICAL CONSTRUCTION AND MAINTENANCE delivers 44,269 Electrical Men of whom 4,079 are primarily concerned with design, but who must also be completely familiar with techniques of installation and maintenance.

1962 Theme Issues:
Systems Design; July —

 Installation	 *Maintenance*	**Sell the Electrical Man in the publication he pays to read**
While not called upon to install systems, the consultant must be familiar with installation practice and problems. The best designed system is useless if it is not practical to install economically. Additionally, he often has the responsibility to assure compliance with his own specifications.	In designing an electrical system, the consultant is always aware that someone else will have to keep it in operation with a minimum of down-time and expense. Such considerations frequently dictate design decisions.	*Some magazines concentrate editorial coverage on system design. They ignore the consultant's essential requirements for installation and maintenance information. ELECTRICAL CONSTRUCTION AND MAINTENANCE serves the needs of the Electrical Man—all three parts of him.*
To do his installation job properly, the contractor and his men must be closely familiar with and take advantage of the time-saving, cost-cutting features of the products they must use. Equipment purchases often are influenced by their knowledge of product reliability and ease of installation.	Often, industry calls upon the contractor to maintain a plant's electrical system on a contract basis. In addition, during installation, he must anticipate the maintenance requirements of plant personnel responsible for a system's proper functioning.	*Some magazines concentrate editorial coverage on installation practices and problems. They forget that the electrical contractor must be equally familiar with design and maintenance techniques. ELECTRICAL CONSTRUCTION AND MAINTENANCE serves the needs of the Electrical Man—all three parts of him.*
To operate and maintain an electrical system, the plant electrical man must have a working knowledge of installation detail to minimize his company's costs and his own maintenance troubles. In his role as installer, the plant electrical man must understand the application of products in helping him solve his needs.	The economical and efficient day-to-day operation of his electrical system is this man's responsibility. In addition to performance benefits, product features which contribute to efficient, low-cost electrical service must be sold to him.	*Some magazines concentrate editorial coverage on plant maintenance. They consequently gloss over the important needs of the plant electrical man for design and installation information. ELECTRICAL CONSTRUCTION AND MAINTENANCE serves the needs of the Electrical Man—all three parts of him.*
ELECTRICAL CONSTRUCTION AND MAINTENANCE delivers 44,269 Electrical Men, of whom 23,450 are primarily concerned with installation, but who also require technical data on design and maintenance.	ELECTRICAL CONSTRUCTION AND MAINTENANCE delivers 44,269 Electrical Men, of whom 14,648 are primarily concerned with plant system operation and maintenance, but also must be aware of equipment and system design and installation.	*Only in Electrical Construction and Maintenance are the needs of the Electrical Man — all three parts of him — concentrated on the central technology he must have to perform his three-sided job. Call your EC&M representative for more information on how to sell the Electrical Man.*

January—*Outlook and Review of 1962;* March — *Electric Space Heating;* May — *Modern Electrical Tools and Equipment;* September — *Annual Statistical Issue;* October — *Annual Lighting Issue.*

"A Heated Discussion"

A short play on words and conduit

White hat: Whoo, boy, this is a real scorcher! Hardly breathe near this blast furnace. Show me those steel raceways.

Dark hat: Here they are. Been up there for years in all this heat. Hasn't fazed them a bit.

White hat: That'll look great in my report. Don't you think we're a little close to that hot stuff? I got this heavy wool suit on and . . .

Dark hat: You don't have to baby steel conduit, nossir. It's got the strength to take all the manhandling you can give it—and you can bend it without worrying about flattening or wrinkling.

White hat: Look at that hot stuff slosh around in there!

Dark hat: And you don't have to protect steel raceways with any organic covering when you run them through or along concrete. Saves a lot of time when you're putting in two, three miles of raceways.

White hat: Yeah. Well, that about wraps it up. Let's go!

Dark hat: You can thread steel conduit with regular dies and you don't need special lubricants to do it. Makes them easy to install and saves plenty of time and money.

White hat: You bet. Let's get out of here!

Dark hat: Steel conduit gives you a grounded metallic system, too; induced currents are drained off without danger.

White hat: Let's go!

Dark hat: Steel conduit's got a smooth interior; makes it easy to pull wires and cable and saves you a lot of time and money if you ever have to rewire. Let's go, OK?

White hat: Say, notice an odd smell . . . like wool burning?

USS
TRADEMARK

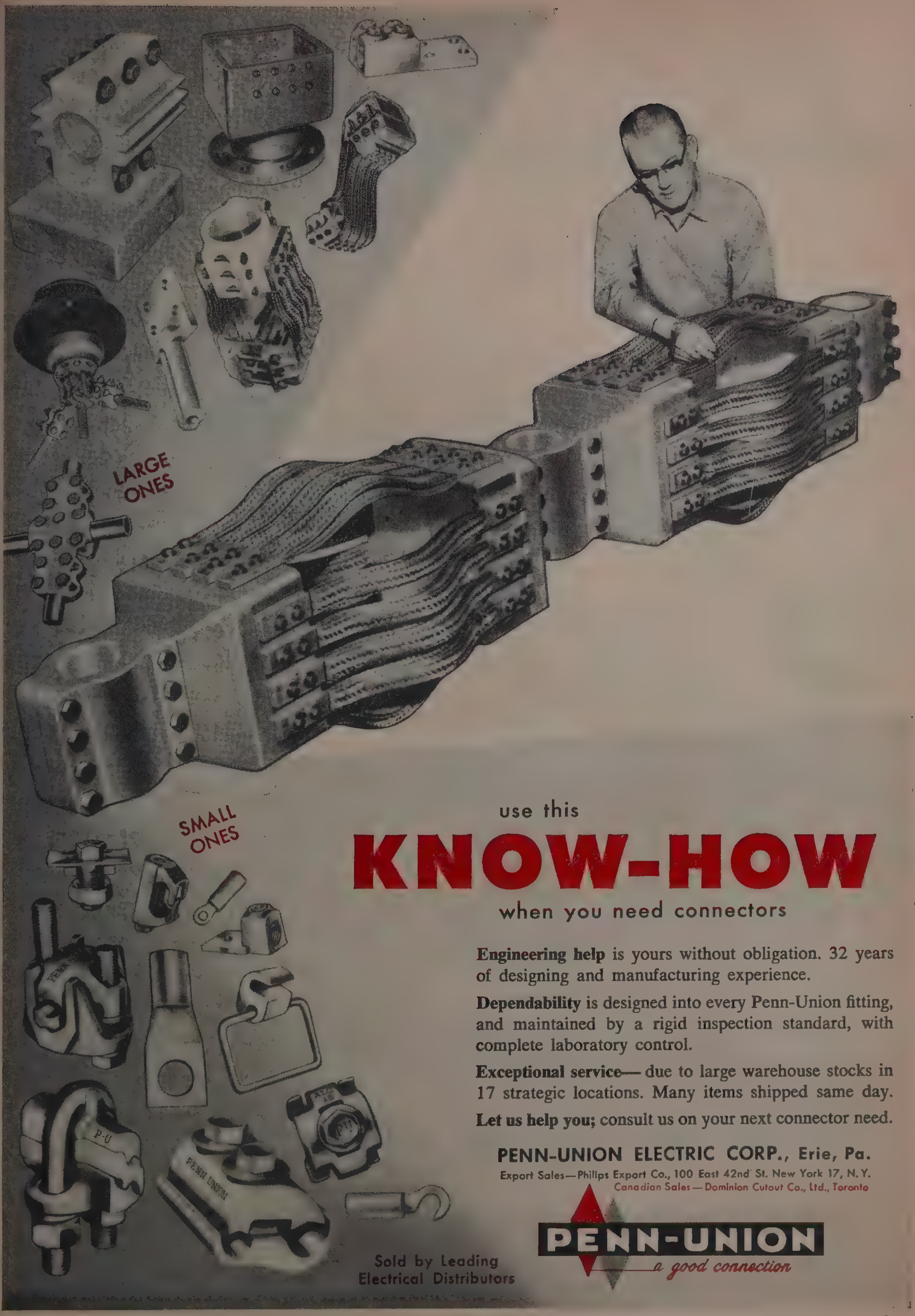
National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors

United States Steel Export Company, New York

America's leading steel pipe manufacturer supplying America's foremost conduit manufacturers

Steel This mark tells you a product is made of modern, dependable Steel.



use this

KNOW-HOW

when you need connectors

Engineering help is yours without obligation. 32 years of designing and manufacturing experience.

Dependability is designed into every Penn-Union fitting, and maintained by a rigid inspection standard, with complete laboratory control.

Exceptional service— due to large warehouse stocks in 17 strategic locations. Many items shipped same day.

Let us help you; consult us on your next connector need.

PENN-UNION ELECTRIC CORP., Erie, Pa.
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PENN-UNION
a good connection

Bring out the best in Electric Heating with Honeywell quality controls

The new Honeywell T462 Line Voltage Thermostat offers the very finest for your economy-minded customers. A beauty in any room, this compact new thermostat gives dependable, worry-free performance—high load capacity plus accuracy and responsiveness. The new T462 was especially developed for electric heating, with a control range from 40°-85° with less than one-half degree differential. The T462 offers everything you could ask for in a quality-built line voltage thermostat.

Honeywell

H HONEYWELL *First in Control*
SINCE 1885

T462A—SPST Switching With Manual Single-Line Break in "No-Heat" Position.
T462B—SPST Switching With Manual Double-Line Break in "Off" Position.

For complete data on these and the complete line of low voltage controls, write Honeywell, Department EC-12-13, Minneapolis 8, Minnesota.

61ST YEAR • DECEMBER 1961

ELECTRICAL CONSTRUCTION AND MAINTENANCE

Heat is the Key

At the recent annual conference of the International Association of Electric Leagues in Atlantic City, there was extensive discussion, as might be expected, of all-electric home prospects. Much progress continues to be made and the outlook is cheerfully bright for next year. But the rumbles of gas competition are growing louder.

The total-electric home not so long ago was considered pretty far out, even by electrical industry people. Many still look upon Gold Medallion promotion as a sort of top-of-the-line spectacular giving excitement and glamour to more modest electrical sales objectives. This it does, unquestionably. But the all-out total electric job is what worries the competition because it is an unbeatable package and they know it.

This the electrical industry has yet to learn. We are overly content with modest successes in partial electrification and individual appliance sales when all the time the key is electric heat. Once the decision is made to install electric heating the contest is over. The whole array of home services and appliances go all-electric as a matter of course.

The powerful sales potential of all-electric is readily apparent from outside the electrical industry but little appreciated from within. We admire the new all-electric home, school, motel, restaurant or apartment house, especially if we had some profitable part in it, but we rarely recognize the full significance of what has been done. In most cases the all-electric services and facilities cannot be matched in cost and performance by any combination of alternative measures.

It is to be expected that determined competition will be doing its best to beat all-electric at every step. It will concentrate on the key services of heat and hot water which can then be used to influence the choice of cooking, laundry and air-conditioning appliances. It will certainly exploit every weakness in electrical sales tactics.

Over much of the country electric heat is still relatively new. Many of our contractors and engineers look upon all-electric as an advanced position from which they may withdraw to more familiar unchallenged objectives if the competition gets rough. We are going to have to learn that all-electric is the main issue, our most powerful sales posture and an objective that must not be compromised.

Wm. T. Stuart

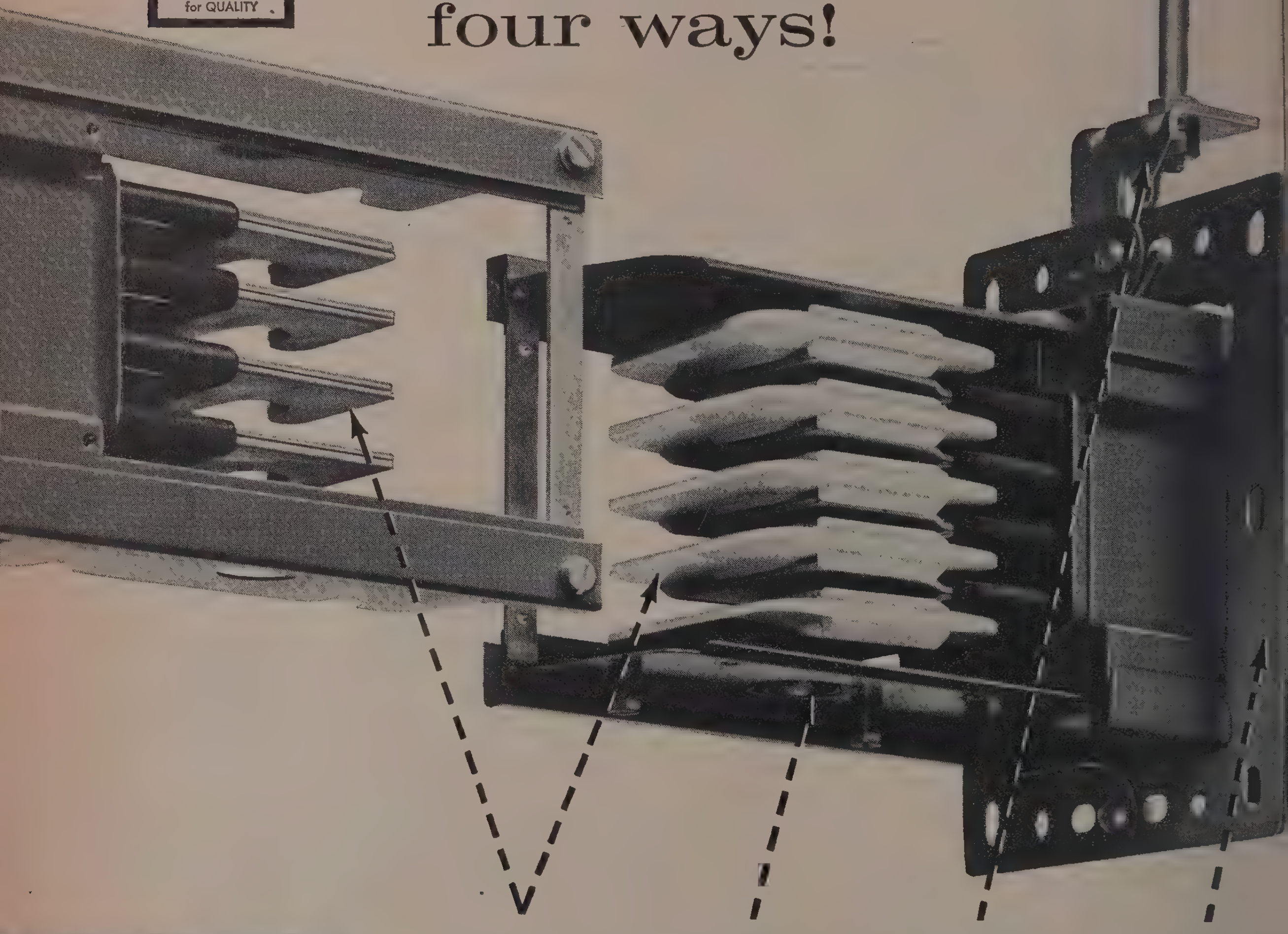
KNOW YOUR SYMBOLS

This symbol stands for bus duct

This symbol stands for QUALITY

XL Bus Duct by BullDog

Makes light work of installation four ways!



1 *Keyed ends* of plated aluminum bars align automatically, join as fast as sections can be handled.

2 *Single integral bolt* spins tight quickly to secure bars under a ton of pressure. Captive screws join casings together.

3 *New* HANGFAST *Adapter* bolts to suspension rod fast ...duct with standard hanger is instantly hooked and secured.

4 *Lightweight*, rigidly-made 10-foot sections require only *half* as many hangers as ordinary duct.

PLUG-IN SAFETY—Self-supporting XL Safety Plug hooks to duct, leaving workman's hands free to complete electrical plug-in with utmost ease and safety.

BullDog, the creator of plug-in bus duct, has for years assisted industrial plant operations by providing high performance, efficiency, flexibility and dependability in power distribution. Then BullDog went one step further . . . developed XL BUStribution® Duct to make installation and handling easier than ever before, as shown above. At the same time, BullDog incorporated foolproof dead-front safety as well as other features ensuring that workmen plug in for power the safe way *only!*

Ask your BullDog representative to show you all these XL Duct installation and safety advantages. He can also provide complete information about BullDog BD plug-in duct, LO-X® plug-in duct and LO-X feeder duct.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N.Y.

I-T-E CIRCUIT BREAKER COMPANY

BULLDOG ELECTRIC PRODUCTS DIVISION

ELECTRIC HEAT is advertised by motel sign and contractor's trailer during construction. Sign still promotes electric heat as a guest comfort feature.

Electric Heat For Midwest Motel

- Cut construction costs about $50,000.
- Boosted annual income by adding three rental units.
- Permits economical central office set-back control of heating and cooling in vacant units.
- More than doubled amount of original electrical contract.

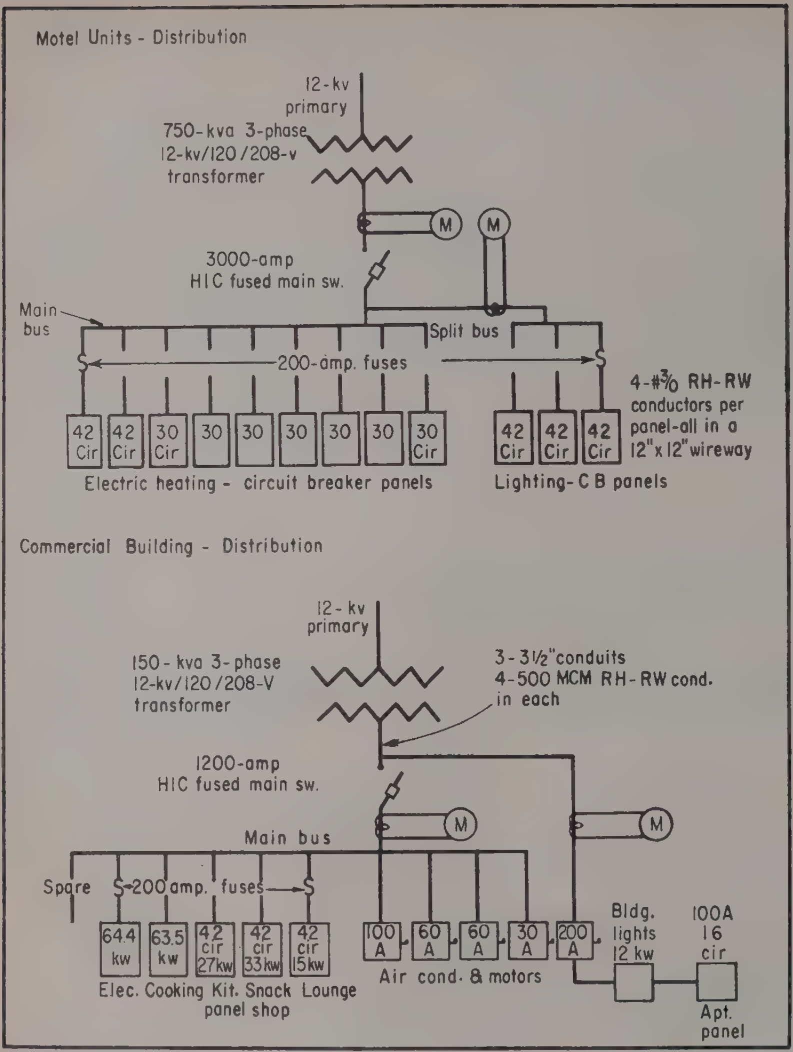
By August Eckel

ELECTRIC space heating continues to gain ground in the motel field. Among the larger midwest installations is the new Holiday Inn of America, 109-unit motel on U.S. Route 6 and Interstate 80 at Torrence Avenue near Chicago. Located at the south gateway to Chicagoland and the belt expressway connecting Indiana to Wisconsin, this latest addition to Chicago-area motels offers its guests the comfort and convenience of electric heat; air conditioning; swimming pool; and a commercial building with an all-electric kitchen, dining room, snack shop, lounge and two spacious conference rooms.

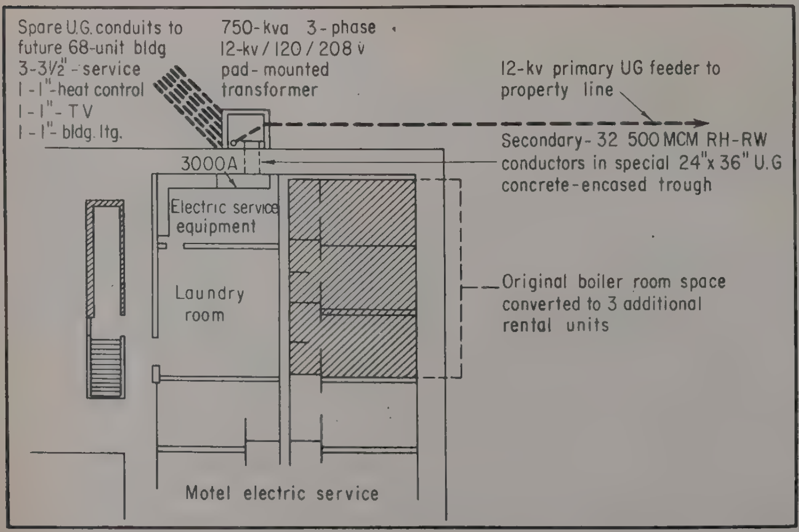
When Brown Electric Service of Chicago, project electrical contractor, first figured the job, it was for conventional wiring for a 106-unit motel and commercial building. Original plans and specifications called for a gas-fired, central hot-water heating system and gas air conditioning. Realizing that the motel design was a "natural" for electric heating, representatives of Brown Electric Service, the utility and the electric heating equipment manufacturer pooled their sales and engineering talents to tell management the electric heat story. But, it took more than a cooperative sales effort to convince owner-manager James Biel, an experienced motel operator, that he should switch from the all-gas system. Cold, hard economic and engineering facts tipped the scales in favor of electric heating and air conditioning.

In addition to the acknowledged features of electric space heating, the following major economic advantages resulted from the switch:

1. Savings of an estimated $50,000 in original construction costs.
2. Additional income from three extra rental units occupying the space originally allotted to the boiler room. Estimated annual income per rental unit is about $2,000.
3. Operating economy offered by central office "set-back" control of heaters and shut-off or room air conditioners in unoccupied units. This simple method of preventing heating and cooling waste in unrented units had high appeal.
4. The convenience of single room thermostat control of heating or cooling when unit is occupied.


Motel Units - Distribution
12-kv primary
750-kva 3-phase 12-kv/120/208-v transformer
M
M
3000-amp HIC fused main sw.
Main bus
Split bus
200-amp. fuses
4-#3/0 RH-RW conductors per panel-all in a 12"x12" wireway
42 Cir
42 Cir
30 Cir
30
30
30
30
30
30 Cir
42 Cir
42 Cir
42 Cir
Electric heating - circuit breaker panels
Lighting-C B panels
Commercial Building - Distribution
12-kv primary
150-kva 3-phase 12-kv/120/208-V transformer
3-3½" conduits 4-500 MCM RH-RW cond. in each
1200-amp HIC fused main sw.
M
M
Main bus
Spare
200 amp. fuses
64.4 kw
63.5 kw
42 cir 27kw
42 cir 33kw
42 cir 15kw
100 A
60 A
60 A
30 A
200 A
Bldg. lights 12 kw
100A 16 cir
Elec. Cooking Kit. panel
Snack shop
Lounge
Air cond. & motors
Apt. panel

SERVICE and distribution diagrams for motel and commercial buildings. Note split-bus and dual metering scheme to determine electric heating consumption of motel units.


Spare U.G. conduits to future 68-unit bldg
3-3½" - service
1-1" - heat control
1-1" - TV
1-1" - bldg. ltg.
750-kva 3-phase 12-kv/120/208 v pad-mounted transformer
12-kv primary UG feeder to property line
3000A
Secondary- 32 500 MCM RH-RW conductors in special 24"x 36" U.G concrete-encased trough
Electric service equipment
Laundry room
Original boiler room space converted to 3 additional rental units
Motel electric service

PLAN of motel electric service area. Note three "bonus" rental units in space originally designated as a boiler room.

5. Reasonable heating rate of 1.62 cents per kwhr offered by the utility. Also provision of dual metering (standard utility practice for commercial electric heating) to measure actual heating use. Owner is given benefit of lower rate scale if consumption warrants.

6. Savings in normal maintenance associated with conventional fuel-fired heating systems.

The window-wall design for three sides of the commercial building made advisability of electric heat for this area highly questionable. Cost studies confirmed this and it was not recommended. However, all commercial cooking equipment went electric as did some 40 tons of air conditioning for the building.

In addition to the economic advantages to motel management, the big switch gave the utility a highly desirable load; equipment manufacturers a nice order for electric heating, cooking and air conditioning units; and the electrical contractor an installation contract more than double the size of his original bid.

Electric Service

Power is provided through two separate services. The 1200-amp commercial-building service, located in a room off the building lobby and motel office, is backed up by a 150 kva, 3-phase, 12-kv/120/208-volt, pad-mounted, outdoor transformer. Primary and secondary feeders are underground.

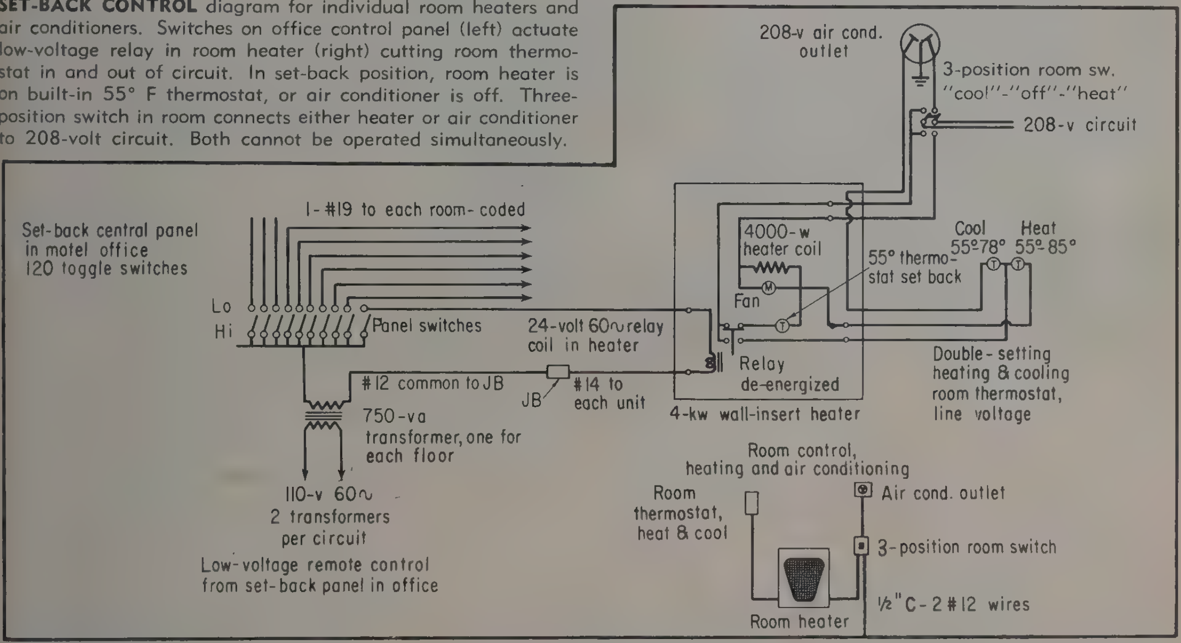
A 3000-amp service for the two-story L-shaped motel structure is centrally located at the base of the "L." A total of 32 500MCM, RH-RW underground service conductors in a special 24-in. by 36-in. concrete-encased metal trough originate at a 750-kva, 12-kv/120/208-volt, 3-phase, outdoor, pad-mounted transformer. The primary feeder goes underground to a utility pole at the property line.

The service switchboard has a 3000-amp, high-capacity-fuse main switch; a split-bus distribution section with fuse protection for feeders to circuit-breaker load centers; and a potential-transformer section for two meters. One meter is on the line side of the main switch; the other is on the split-bus panel section feeding only lighting and general purpose panels. This arrangement permits an accurate determination of actual electric heating and total kwhr consumption for

MOTEL BUILDING is a two-story L-shaped structure. Rental units have dual-pane window-wall in front; 1-hp air conditioner over door.

OUTDOOR TRANSFORMER at base of the L-shaped motel building is adjacent to electric service room. Three-phase unit is rated 750 kva, 12kv/120/208 volts. Primary and secondary service cables are underground.

SET-BACK CONTROL diagram for individual room heaters and air conditioners. Switches on office control panel (left) actuate low-voltage relay in room heater (right) cutting room thermostat in and out of circuit. In set-back position, room heater is on built-in 55° F thermostat, or air conditioner is off. Three-position switch in room connects either heater or air conditioner to 208-volt circuit. Both cannot be operated simultaneously.



208-v air cond. outlet
3-position room sw. "cool"-"off"-"heat"
208-v circuit
1-#19 to each room-coded
Set-back central panel in motel office 120 toggle switches
Lo
Hi
Panel switches
24-volt 60~ relay coil in heater
#12 common to JB
JB
#14 to each unit
750-va transformer, one for each floor
110-v 60~
2 transformers per circuit
Low-voltage remote control from set-back panel in office
4000-w heater coil
Fan
M
55° thermostat set back
T
Relay de-energized
4-kw wall-insert heater
Cool 55°-78°
Heat 55°-85°
Double-setting heating & cooling room thermostat, line voltage
Room control, heating and air conditioning
Room thermostat, heat & cool
Air cond. outlet
3-position room switch
½" C-2 #12 wires
Room heater

billing and cost accounting purposes.

Twelve load-center panels, ranging from 30- to 42-circuit size, line the walls of the electric equipment room. They are mounted between bottom and top metal troughs to facilitate feeder and branch-circuit installation. Nine of these circuit-breaker panels serve the heating loads of the motel structure; three serve lighting and miscellaneous loads. A separate load center, using 20 circuits at present, serves outdoor lighting and is time-clock and contactor-controlled with a remote switch in the motel office.

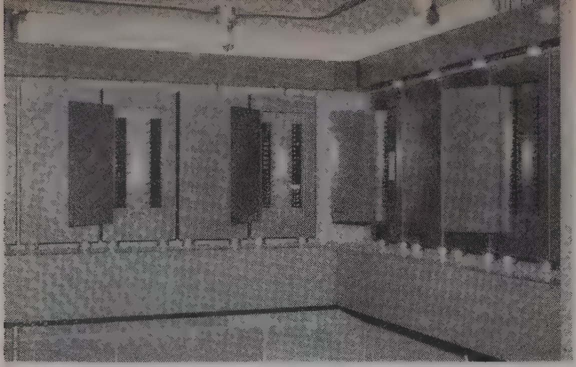
Adjacent to the electric equipment room and laundry room are the three "bonus" rental units. They occupy the ground-floor area originally designated as a boiler room for the specified gas-fired heating system.

Each of the 109 motel units has a 4-kw, 208-volt, fan-driven, wall-insert heater located in the partition behind the entrance door. A 1-hp, 208-volt, room air conditioner mounted above the door provides summer cooling. Supplementary heating in bath areas is provided by a 1475-watt combination heat-light-vent unit in the ceiling.

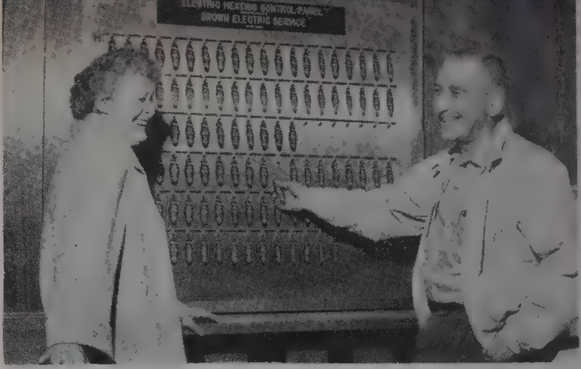
Thermal insulation consists of a 1-in. layer of Styrofoam in ceiling, outside masonry walls and panels over window areas.

Selection of the fan-driven heater solved two problems. The first was of a design nature. The front dual-pane window-wall construction precluded use of baseboard units under the windows. The second pertained to room-heat recovery after set-back. Management wanted the units brought up to comfort level as soon as possible. With the fan-driven heaters, it is estimated that room temperature can be raised 1°F every two minutes at a 20°F outdoor temperature.

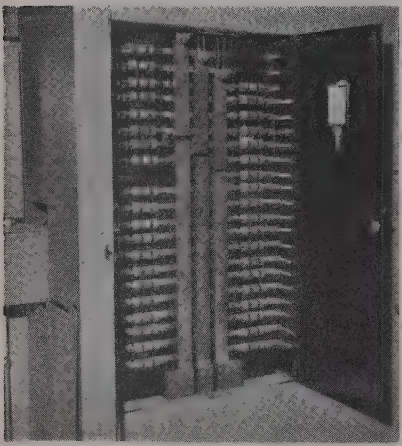
Availability of a 25-amp, line-voltage, double-setting, heating and cooling (common bellows) room thermostat contributed to operating convenience and installation economy. One side of the thermostat "makes" on a temperature rise (air conditioning); the other side



LOAD CENTER panels (circuit-breaker type) line walls adjacent to service equipment. Nine serve heating; three, lighting. Top and bottom troughs enclose feeder and branch-circuit conductors.

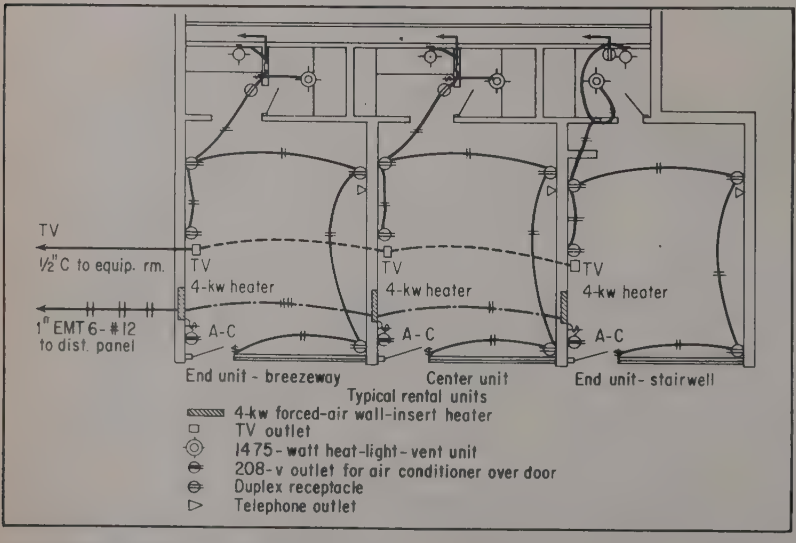


SET-BACK CONTROL PANEL operation is explained by its designer Irv Drucker of Brown Electric Service. Mrs. Kay Biel, wife of manager, agrees that keys will remind them to set-back heating in unvented units.



SPLIT BUS in distribution section of main panel separates lighting (top) from electric heating (bottom) loads for metering and cost-accounting purposes. All fuses are 200-amp size.

HEATING AND COOLING units in typical motel unit. H. C. Barkow, Commonwealth Edison Co., adjusts room thermostat. Electrical contractor H. M. Brown points to 4-kw wall heater; stands in front of 3-position transfer switch. Note air contioner above door.



ELECTRIC LAYOUT for typical motel units. There are 109 of these in the L-shaped two-story structure.

"makes" on a temperature fall (heating). Operating range is from 55°-78°F for cooling and from 55°-85°F for heating.

Guests have choice of room heating or cooling, whichever they desire, through a transfer toggle switch on the wall behind the door. The 20-amp, 2-pole, 3-position switch energizes the heater in one position; the air conditioner in the other; provides positive disconnect in center "off" position. Both cannot be energized or operated simultaneously. Once the choice is made and the room thermostat set at the desired level, operation is automatic.

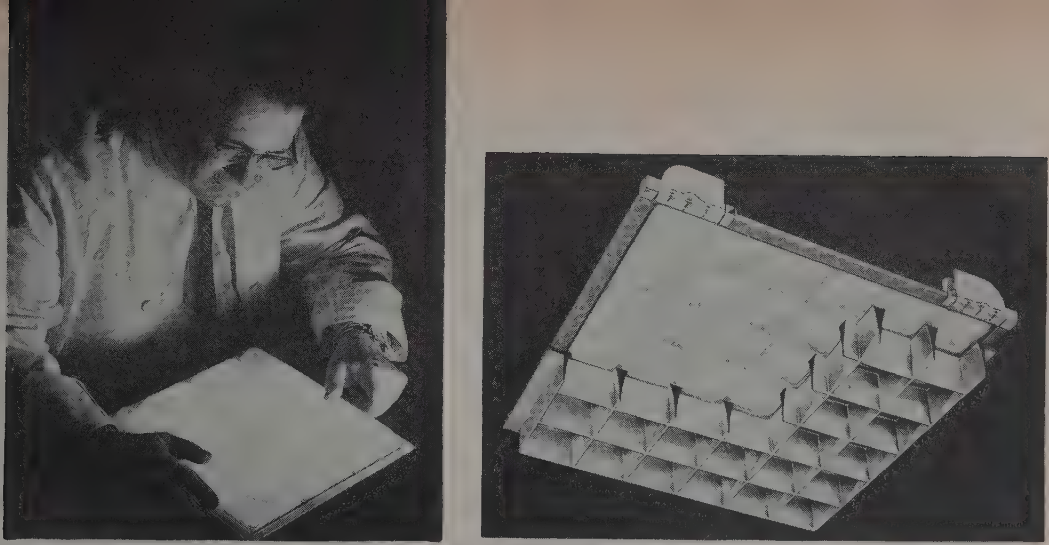
To enhance operating economy, Brown Electric Service engineer Irv Drucker designed a unique low-voltage, individual unit, set-back control system operated from a central panel in the motel office. The scheme is practically "neglect-proof" because it is keyed to guest arrival and departure and the control panel actually is a rack for room keys. Each key of a vacant room is hooked on the turned-up toggle of the switch for that room.

When switches are in the "up" or "Lo" position, room heat is set back to 55°F and controlled by a constant thermostat built in the wall heater. If the room transfer switch is in "cooling" position, the air conditioner is turned off.

When a guest registers, the key to his assigned room is "pulled down" off the rack. This motion shifts the remote-control switch toggle to the "down" or "Hi" position and returns the wall heater to room thermostat control (in winter) or energizes the air conditioner (in summer).

After check out, guest keys are returned to the rack-panel to indi-

(Continued on page 161)



NEW PANEL fluorescent lamp, is not only new in design, but also new in concept. It is an area source, which fits a 12-in. square module, and is only 1½ in. deep. Face of lamp is of waffle design (right) while back of lamp shows sinuous shape of 5-ft tube for electric arc (left). Illustration at (right) also shows cutaway view of special wedge-type louver which may be used for shielding.

New Light Sources

To Aid Lighting Progress

Recently announced light sources contain many new and advanced features, and provide important new tools and techniques for advanced lighting design practice. Some of these new lamps are herein described and discussed.

By Berlon C. Cooper

ELECTRIC light sources, or "lamps," as they are more commonly called, are literally the "heart" of all electric lighting systems. It is the light source which produces the light—the luminaires, light control devices, decorative features, etc. may all be considered as lighting system "accessories," or components. Thus the light source is the key to lighting application, and the "accessories" must be selected to conform with and support the type of light source (or sources) selected.

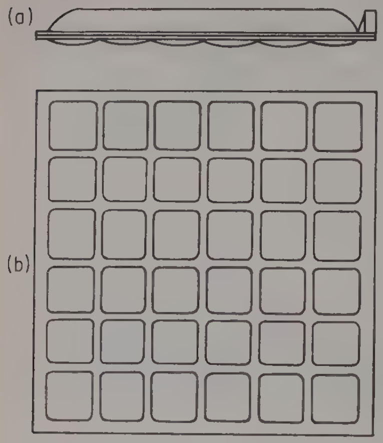
Over the past several months, some rather spectacular advances and developments in light sources have been made and announced by the various lamp manufacturers. These new light sources are essentially new lighting tools, now available for use by the lighting engineers and lighting system designers. Intelligent application and use of these new lamps, added to the expanding use of the wide variety of already existing older lamps, will constitute our growth in lighting progress and advancing lighting standards.

In order that the significance of some of these new light-source developments may be better understood, a roundup of some of the more important new lamps is presented here. These new lamps have all been announced previously through normal and regular trade channels. But it is felt that this roundup presentation may help to pinpoint the important significance of these new lamps, and suggest new application techniques to the designers, specifiers and installers of modern lighting systems.

The newest development in light sources is the panel fluorescent lamp. This lamp is new, and of importance to the lighting industry, in that it is in the shape of a thin panel, 11⅝-in. square and 1½-in. deep, and designed to fit a one-ft-square module. Also, from an optical viewpoint, it may be considered as an "area" light source. It can be used singly, or in groups. Further, it can be used as a built-in, surface-mounted, suspended or free-standing device, where a small size and high light output is required.

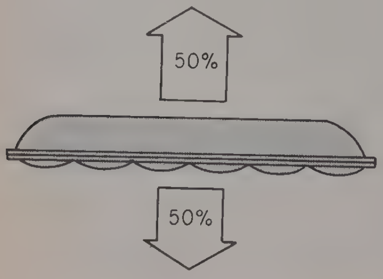
The face of the panel fluorescent lamp has a waffle-pattern configuration composed of 1¾-in. squares. This design makes possible the use of the lamp in luminaires equipped with louvers of an identical grid spacing, for efficient control of the

Panel Fluorescent Lamp



(a) Side elevation
(b) Reflected plan

Light Distribution for Panel Fluorescent Lamp



Light distribution

light. The face pattern also diffuses the light, and conceals the path of the mercury vapor arc.

The rear surface of the lamp reveals the 5-ft-long mercury vapor arc path, which has been created in a sinuous path enclosed within the area of the lamp.

The lamp, of rapid start design, uses bi-pin terminals. These are positioned behind an outer rim at adjacent corners, and are entirely within the over-all depth and other dimensions of the panel. The terminal arrangement permits the use of push-pull connectors, which can be inserted with one hand. This arrangement makes it simple to apply the lamp to luminaires of various designs, and simplifies lamp installation and maintenance.

The first panel lamp to be made available emits light in equal amounts from the front and back. A later model will have a reflective coating on the back to direct most of the light from the front.

The panel lamp is designed to operate at either 80 or 50 watts. At 80 watts it produces 4800 lumens (60 lumens per watt), with an average face brightness of 3200 footlamberts. At 50 watts, it produces 2900 lumens (58 lumens per watt), with an average face brightness of 1930 footlamberts. Rated average life at both wattages is 7500 hours. This lamp is available now in cool white, and deluxe white colors will be made available later.

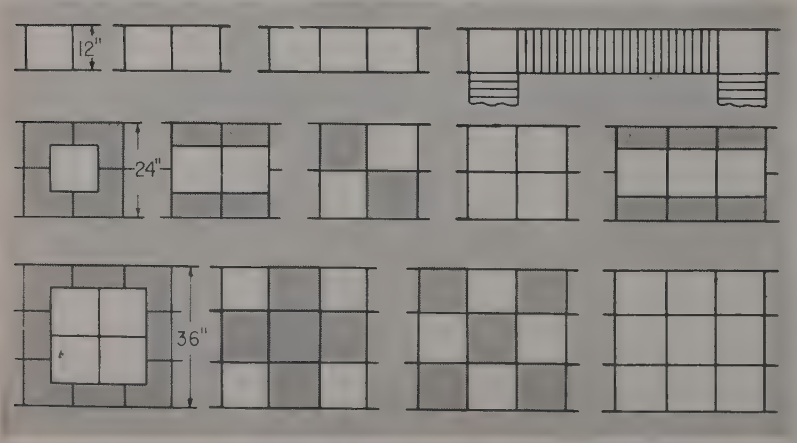
The panel lamp has many significant new features from the standpoint of lighting application design. Its compact square shape, for example, is refreshingly new and opens major new fields for luminaire designs, built-in applications, and architectural lighting treatments. Several typical combinations and luminaire and architectural design ideas are shown in the accompanying illustrations. Lighting equipment manufacturers are currently at work on new luminaire designs of attractive and interesting appearance. And architects and lighting designers will be quick to find many new and interesting applications for this unique new light source.

Lighting engineers have long discussed the need for an "area" light source, to implement the already-available "point," "line," and "circular" light sources, and many have envisioned the electroluminescent lamps, under research and study for more than a decade, as the ultimate ideal in such a lamp. Electroluminescent lamps would, for all practical purposes, be a two-dimensional "area" source, since their thickness would be about ⅛-in. or less, and have already been put in production for applications which require very low brightnesses, in the order of up to 30 or 40 footlamberts.

The new panel fluorescent lamps meet all the requirements of the ideal "area" light source, with only two limitations—its thickness is 1½-in. deep (which is certainly close to the envisioned ideal of the electroluminescent lamp), and its area is limited to modules of 12 in. Its brightness can be varied from blackout to 3200 footlamberts, by dimming.

The panel fluorescent lamp is truly revolutionary in concept, and adds a new dimension to lighting design and lighting application. With its many new features, it will contribute to carrying lighting practice and lighting applications to new heights. It will unquestionably have a dramatic impact upon the future lighting of the commercial and industrial buildings and homes of America.

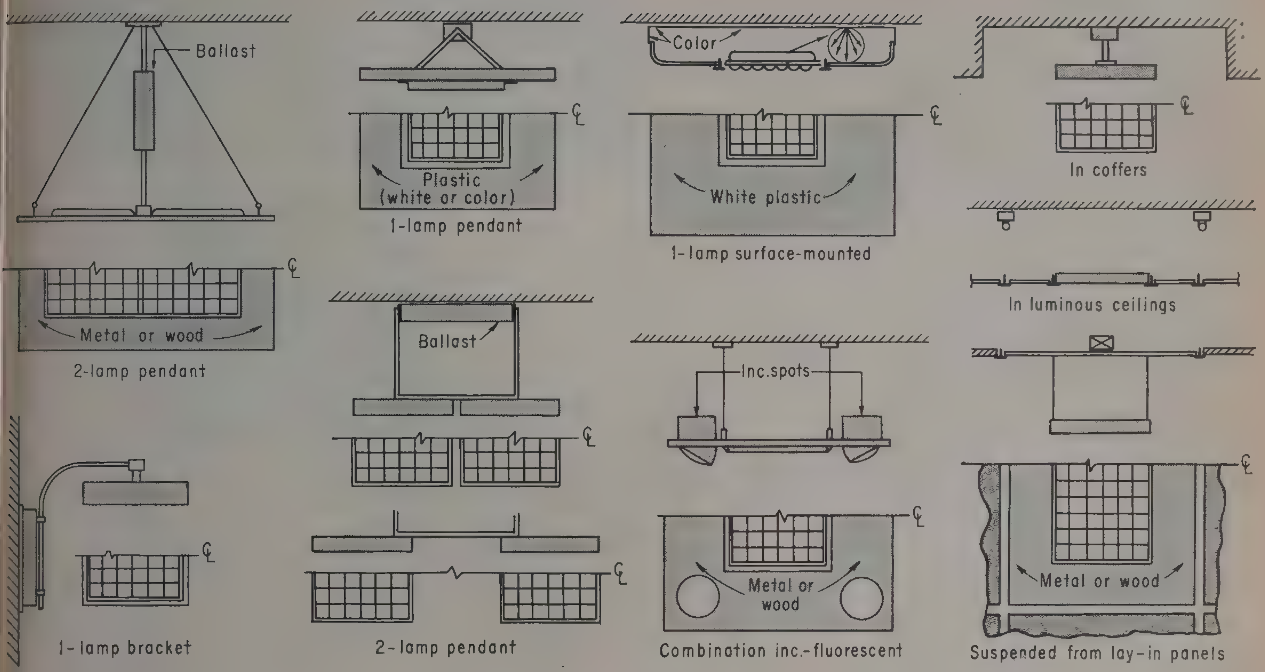
Modular Size Permits Wide Design Flexibility



Quartzline Incandescent Lamps

The Quartzline lamp is an incandescent light source development, with a combination of features never before available in any type of lamp. While it was announced several months ago, the industry has been slow to capitalize on these many features. Major activity to date has been in the fields of outdoor floodlighting, and the lighting of airport runways. There are many other areas of lighting application where the features and advantages of this lamp offer new economies and unique benefits.

The new Quartzline lamp is a ⅜-



Panel Fluorescent Lamps Can Be Used

. . . In Luminaries

. . . Architecturally

1-lamp pendant

1-lamp surface-mounted

In coffers

In luminous ceilings

2-lamp pendant

1-lamp bracket

2-lamp pendant

Combination inc.-fluorescent

Suspended from lay-in panels

in. diameter quartz envelope, housing a tungsten filament and traces of iodine gas. Wattage, and light output, are a function of length of the filament. Currently, the Quartzline family of available lamps consists of five sizes, as shown in Table II, and other sizes will undoubtedly be made available as specific requirements develop.

Here are some of the features of the Quartzline lamps which open up a broad range of opportunities in lighting application:

Compact Size—Lamp is only $\frac{3}{8}$-in. diameter. The 500-watt lamp has a nominal length of 5 in., and the 1500-watt lamp a nominal length of 10 in. The 1500-watt lamp is thus 1/200th of the size of a standard 1500-watt PS-52 general service lamp.

Precise Beam Control — The straight-line filament makes possible an accurate light beam as narrow as six degrees in one dimension. The shape of the lamp makes it easy to produce a rectangular beam.

Efficient—Initial light output is 21-22 lumens per watt, which is maintained at nearly 100% throughout life, because of its iodine cycle which prevents tungsten particles from accumulating on the bulb wall and obscuring light.

Long Life — Rated average life for the Quartzline lamps is 2000 hours, double the life of general service type filament lamps.

Economical—Relatively few lamps are required to produce large amounts of light. The small size of the lamps also permits more compact luminaires.

Floodlight units are already available for both the 500-watt and 1500-watt lamps, and are being used to floodlight buildings, monuments, etc., and many sports areas. Also, the 45-watt 6.6-amp series lamps have been used for runways and other airport applications.

The Quartzline lamp makes it possible to use a filament lamp on 240- or 277-volt distribution systems, without sacrifice of efficiency or mechanical strength. This makes it desirable for industrial and large area commercial applications. Other possible applications include show window lighting, outdoor signs, outdoor construction and work areas, store counters, murals, inspection and special application lighting, photographic studio lighting, and similar applications.

Aperture Fluorescent Lamp

Continuing laboratory research and development on fluorescent lamps has been responsible for continuing progress in efficiency, in color quality, in sizes, shapes, configurations and brightness.

Table I—Panel Fluorescent Lamp

(Electrical and Light Output* Ratings)

	Normal Operation	Reduced Wattage Operation
Lamp current (ma)	600	350
Volts	145	160
Watts	80	50
Initial lumens*	4800	2900
Lumens at 40% rated life	4100	2600
Rated life (3 hrs/start)	7500	7500
Brightness (footlamberts)	3200	1930

* Tentative for cool white lamps.
Source: Lamp Dept., General Electric Co.

One development to emerge from this laboratory work is of special interest to lighting designers. This is the "aperture" fluorescent lamp.

The aperture lamp is unique in that its brightness level has been increased to 22,000 footlamberts, through a narrow 30-degree aperture. This arrangement makes it possible to reflect the high intensity, narrow beam by an optically precise reflector, which produces an asymmetric light distribution with a peak brightness of 4000 candlepower from a 48-in. T12 aperture lamp operated at 1500 ma. Details are given in Table III and the accompanying illustrations.

The standard fluorescent lamp is basically a diffuse light source, and even though it is referred to as a "line" light source, the size of the "line" becomes that of the diameter of the lamp. Optically, the size of the "line" (lamp diameter) is too great to permit precise control or, from a practical standpoint, to obtain a beam of light with a "punch" in it. The aperture lamp in combination with a special aperture lamp luminaire, overcomes this problem.

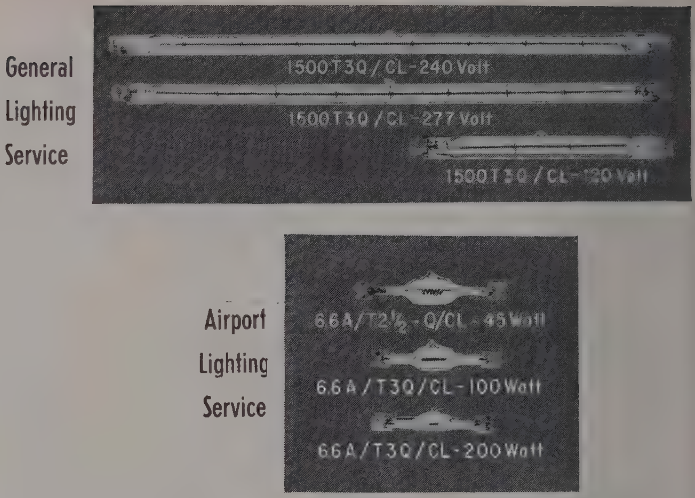
The aperture lamp-luminaire combination is applicable to a wide range of lighting applications, especially where a narrow band of light is needed with a sharp line of cutoff.

A typical application is the floodlighting of a building facade from a cornice or coping on the face of the building. A continuous-row aperture luminaire, extending out about 12 in. over-all, floods the front of the building fairly uniformly.

Another typical application is that of roadway lighting. With the aperture luminaire installed at a height of 38 in. from the roadway to the top, a narrow band of light is projected across the roadway, providing fairly uniform light over the entire roadway.

Other applications include wall washing (interior), mural lighting, lighting of outdoor signs, airport runways, and other areas where a band of light, with a sharp cutoff on one side of the band, is called for. Lighting designers will think of many others.

Quartzline Incandescent Lamps



QUARTZLINE lamps provide a true line source of light for accurate light distribution control; have a very high maintained light output throughout life; offer new economies and efficiencies for incandescent lighting.

Table II—Quartzline Incandescent Lamps

Watts	Volts	Bulb	Initial Lumens	Rated Life (Hrs)	Type Service
1500	240; 277	T3	33,000	2000	General Lighting
500	120	T3	10,500	2000	
45	6.6 Amp	T2½			Airport Lights
100	6.6 Amp	T3			
200	6.6 Amp	T4			

Source: Lamp Dept., General Electric Co.

Aperture Fluorescent Lamp and Luminaire

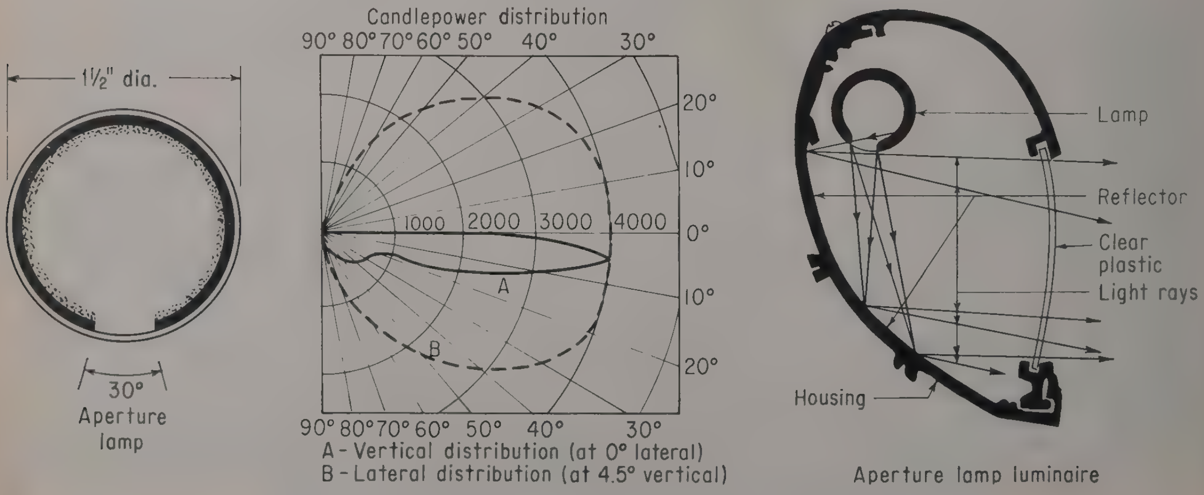


Table III—Aperture Fluorescent Lamp

Bulb	48T12
Lamp watts	115
Lamp current (ma)	1500
Aperture width (degrees)	30
Aperture length (inches)	41½
Aperture brightness (Ft-L)	22,000

Source: Sylvania Electric Products Inc.

Effect of Temperature on Light Output
(For Outdoor Type Fluorescent Lamps)

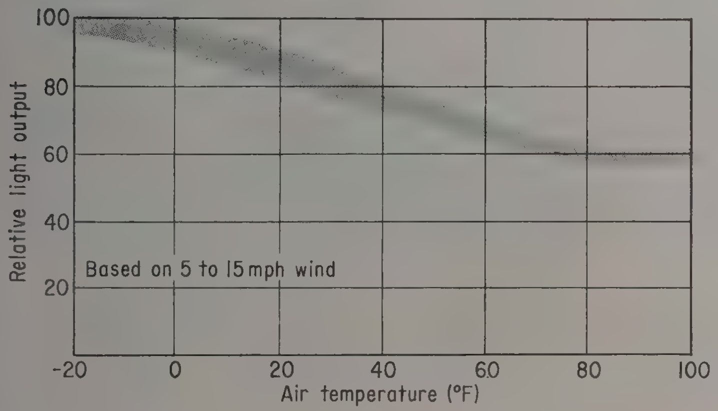


Table IV—Outdoor Fluorescent Lamps

Lamp Designation	Watts	Bulb	Length	Initial Lumens*
F48T10	105	T-10	48″	5,900
F72T10	150	T-10	72″	9,500
F96T10	200	T-10	96″	13,000
F48T10J	105	T-14	48″	5,800
F72T10J	150	Jacketed	72″	9,400
F96T10J	200		96″	12,900

* Light output for cool white lamps, operated at 1500 ma. Economic rated life is 5000 hours.
Source: Lamp Dept., General Electric Co.

Cold Weather Fluorescent Lamps

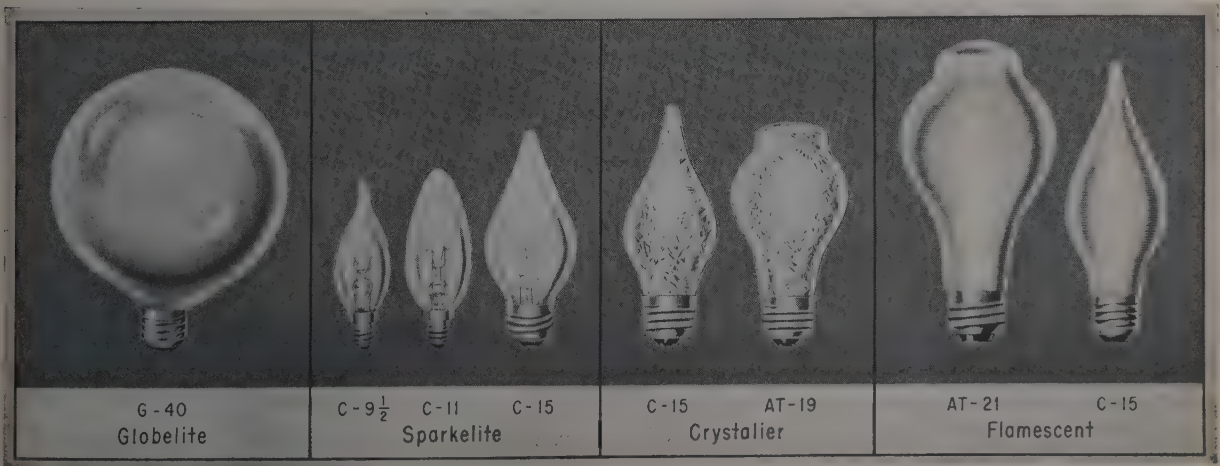
Standard fluorescent lamps have been designed primarily for optimum operation at a temperature of about 77°F. As a result, when these standard lamps are exposed to low temperatures and wind, the lamp tubes are cooled and light output drops—often to 10% of normal output or less at zero degrees Fahrenheit.

In 1960 two new fluorescent lamps were made available which have been designed specifically for use over a wide temperature range. One is the T10 1500 ma lamp, for use in enclosed type luminaires, and the other is the T10J 1500 ma lamp, equipped with an enclosing glass jacket 1¾-in. in diameter, for use in open type luminaires. Each type is available in 48-in., 72-in., and 96-in. lengths. Technical data on these lamps are given in Table IV.

As may be seen in the graph showing "Effect of Temperature on Light Output," these outdoor type fluorescent lamps operate at maximum efficiency in temperatures of −20°F to 0°F, and at as high as 80% of maximum light output at 40°F.

These new outdoor type fluorescent lamps make practical the use of fluorescent lighting for such outdoor lighting applications as billboards, electric signs, building floodlighting, service stations, drive-in restaurants, shopping centers, store fronts, street lighting, parking lots, loading docks, shipyards, and airports—also for such indoor areas as cold storage warehouses, walk-in coolers, and freezers.

Decorative Type Lamp Bulbs



Decorative Incandescent Lamps

In recent years, major emphasis in the lighting industry has been on providing light for comfortable seeing, and for utilitarian uses. In many areas, however, such as in the home, in restaurants, cocktail lounges, hotel and motel lobbies, etc., light is still being used as a means of decoration.

In recent months, some new and spectacular decorative type incandescent lamps have been announced. These new lamps, shown in the accompanying illustrations and described in Table V, provide decorators and homeowners with some fresh and dramatic new designs with which to work.

Since these new lamps have been designed primarily for decoration, they have a designed average rated life of 2500 hours, or over three times the rated life of standard incandescent lamps. This eliminates the need for frequent lamp replacement. Also, they are available in a variety of bulb shapes, to meet the requirements of different decorating motifs. They provide a new and sophisticated concept in lighting charm and beauty, and a much needed supplement for prosaic utilitarian lighting.

Table V—Decorative Type Lamp Bulbs

Type Lamp	Watts	Bulb	Colors
Globelite	25	G-40	Red, Blue, Green, T-W, Cand.
	60	G-40	Tru-White, Candelite
	100	G-40	
	150	G-40	
Sparkelite	8½	C-9½	Clear bulb
	15	C-11	
	25	C-15	
Crystalier	8½	C-9½	Simulated cut glass
	25	C-15	
	25	AT-19	
	40	AT-21	
Flamescent	8½–15	C-9½	Simulated gas flame
	25, 40, 60	C-11	
	25, 40, 60	C-15	
	40, 60	AT-19	
	100	AT-21	
	150	AT-25	

All lamps rated at 2500 hours average life.
C-9½ and C-11 bulbs have skirted candelabra base; all others have medium base.
Source: Duro-Test Corp.

Halogen Lamp

The halogen lamp is a small lamp, filled with halogen vapor, which consumes 650 watts and fits into a compact 2¾-in. reflector. It provides the same quantity of light as four 300-watt R30 photoflood lamps, and was designed primarily as a lightweight, convenient, adjustable light for taking indoor home movies. It has a color temperature 3400 degrees Kelvin, which allows it to be used with Type A color film without filters. It operates on 120-volt, 60-cycle current.

This lamp is of interest to the lighting engineer in that it provides a large amount of light from a small, portable unit, with a minimum of wattage, for any application where lots of light is needed for a very short period of time, such as in industrial photography, for quick inspection of an area, for the quick lighting of a building or monument to observe the effect of a proposed floodlighting application, and for other similar uses.

Described here are some of the more spectacular developments only in light sources over the past couple of years. There have been many other improvements in lamps; new additions to existing lines, improvements in efficiencies, additions of new sizes, new colors, and improvements in color quality of fluorescent and mercury vapor lamps, and many others.

It has been estimated that lamp developments announced during the decade of the Fifties were at least equal to all developments up to that period. The lamps described herein may be classified as developments of the decade of the Sixties, although these lamps were under laboratory research prior to 1960. And while it is impossible to predict what new developments will be made during the next eight years of the decade of the Sixties, it can be logically assumed that great strides in lamp progress will be made. More lamp research and development work is now under way than at any time in the history of the lighting industry.

HALOGEN LAMP in small 2¾-in reflector provides high light output (comparable to four 300-watt R-30 photoflood lamps), and consumes only 650 watts. Designed for use in taking 8 mm indoor home movies, lamp is also useful wherever a lot of light is required for a short period of time.

The lighting designers of today have a wealth of light sources and lighting devices available for their use in solving the lighting application problems which they face from day to day. In fact, the need today is not so much one of new lamps and new lighting accessories, as it is of fresh and imaginative new ideas for application. Lighting equipment manufacturers, and practising architects, electrical engineers and lighting designers may now profitably devote more time and effort to their lighting solutions, and to methods and techniques of using their existing light sources and lighting tools to better advantage. More research and development work, at the lighting system design and application level, is urgently needed. This R and D work is needed to provide the higher lighting levels that are indicated for seeing tasks throughout commerce and industry, and in the home, with more visual comfort and better quality lighting. The new light source developments will help to make this progress possible.

VISITOR enters vestibule at front entrance where he sees his own image on a 5-in. TV monitor, located above directory panel. Concealed TV camera is to left of monitor. Visitor presses a signal button, which sounds a buzzer in a particular apartment.

TENANT hears buzzer signal in her apartment. Walking over to her private TV monitor, she presses a MC button to learn the identity of the visitor. Combination signal, voice and door-control systems are mounted in flush panel directly above TV monitor.

Closed-Circuit TV Safeguards Apartment Tenants

A new Brooklyn apartment building features TV monitors in each apartment, enabling tenants to identify visitors at front and rear entrances of the building.

By J. H. Watt

IN APARTMENT buildings, combination signal, voice and door-control systems have been used for years as a means for tenants to screen callers before permitting them to enter the building. However, this limited form of communication requires tenants to make their presence known before they can establish the identity of a caller.

Designed to overcome this significant limitation is a building-wide, closed-circuit TV system, which permits tenants to check on callers visually before talking to them or letting them into the building. Such a system was recently installed by W. W. Electrical Contractors, Inc., Jamaica, N. Y., in the new 7-story, 112-unit Duplee Apartments in Brooklyn.

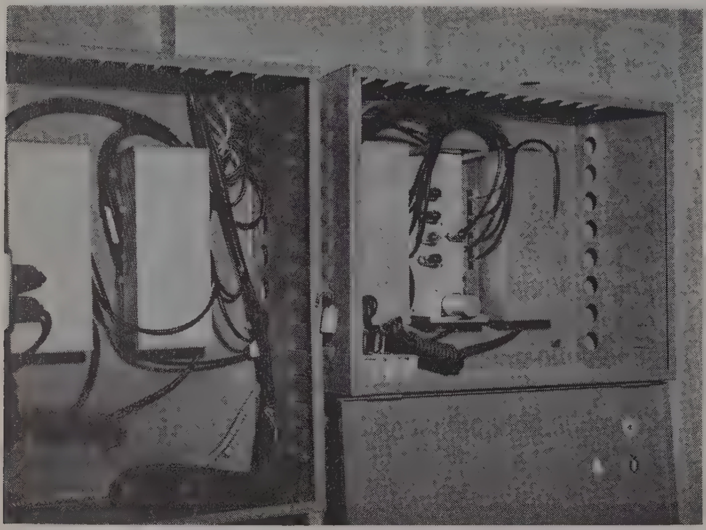
Operation of the TV system is simple. As a visitor enters the front vestibule or rear service entrance, he finds locked doors to the main part of the building. At the same time he notices the customary directory panel, which contains tenants' names and corresponding apartment signal pushbuttons. And to look over the list of tenants, he must step directly in front of a concealed TV camera, where he immediately sees his own image appear on a 5-in. TV monitor, mounted at eye level above the directory panel.

If the visitor has no legitimate

purpose in gaining access to the building proper, the sudden awareness of seeing himself on television is enough to encourage him to leave the premises. On the other hand, if the visitor is making a routine social or business call, he presses the signal pushbutton adjacent to a particular tenant's nameplate. This sounds a buzzer in the appropriate apartment, alerting the tenant.

The tenant then walks over to a 5-in. TV monitor, mounted at a tilted angle in a recessed wall enclosure in his own apartment. After pressing a momentary-contact button atop the monitor, the picture of the caller appears immediately on the TV screen.

If the tenant does not care to acknowledge the call, he simply releases the MC button and ignores further contact with the visitor. Receiving no response from his signal, and not knowing he has been observed by the tenant, the visitor would assume that no one is home. However, if the tenant wants to acknowledge the call, he presses a "talk-listen" button on a flush-mounted house intercom panel, located directly above his TV monitor. This permits a two-way conversation. Finally, to allow the visitor access to the building proper, the tenant pushes a front or rear door-control button on the intercom panel, which electrically releases the corresponding entrance-door lock.



VENTILATED CABINETS contain five video distribution amplifiers. In cabinet to right, cover of center amplifier has been removed to show tubes and coaxial-cable plug-in jack connections. Also note portable-cord plug-in connections for 115-volt power supply to amplifiers.

MAX WEITZMAN, owner of W. W. Electrical Contractors Inc., stands next to rear-entrance directory panel. With top cover removed, concealed TV camera is shown adjacent to 5-in. TV monitor.

Installation Features

Max Weitzman, owner of W. W. Electric, points out that the closed-circuit TV system was easy to install. Major components of the system include: two concealed TV cameras (one each for the front and rear entries); 132 5-in. TV monitors for each apartment and front and rear entries (18 deluxe two-story apartments have two monitors, one on each floor); and five video distribution amplifiers, each of which serves four vertical risers, with each riser supplying an average of seven monitors.

Risers are RG59U coaxial cables, which carry the picture signal from the cameras, through the distribution amplifiers, and on to the monitors. Takeoffs from the vertical coaxial-cable risers to each monitor are accomplished by using isolating terminal blocks, which contain resistor bridges. Each tap passes through a resistor so that in the event trouble occurs in one monitor, the rest of the TV network will not be affected. The coaxial taps terminate in plug-in jacks at the monitors.

Since each monitor contains its own amplifier, it is plug-connected into an integral, 3-pole, 115-volt grounding-type receptacle. Monitor amplifiers are continuously energized and operate at a standby rating of 35 watts, which, at a utility rate of 3 cents per kwhr, amounts to about 2½ cents per day on the individual apartment meters. This low-wattage consumption is possible because, in standby service, only the tube filaments draw current. The normally open, momentary-contact button on the monitor, which is pushed to produce the picture, is actually a switch in the supply to the B+ circuit. With the tube filaments always heated, this is the reason a picture appears quickly after pressing the button. Releasing the button opens the B+ supply, and the monitor again operates at the low standby wattage. External adjustment knobs on each monitor permit vertical-hold, horizontal-hold and brightness control. To provide uniform clarity throughout the system, picture contrast is adjusted at the cameras.

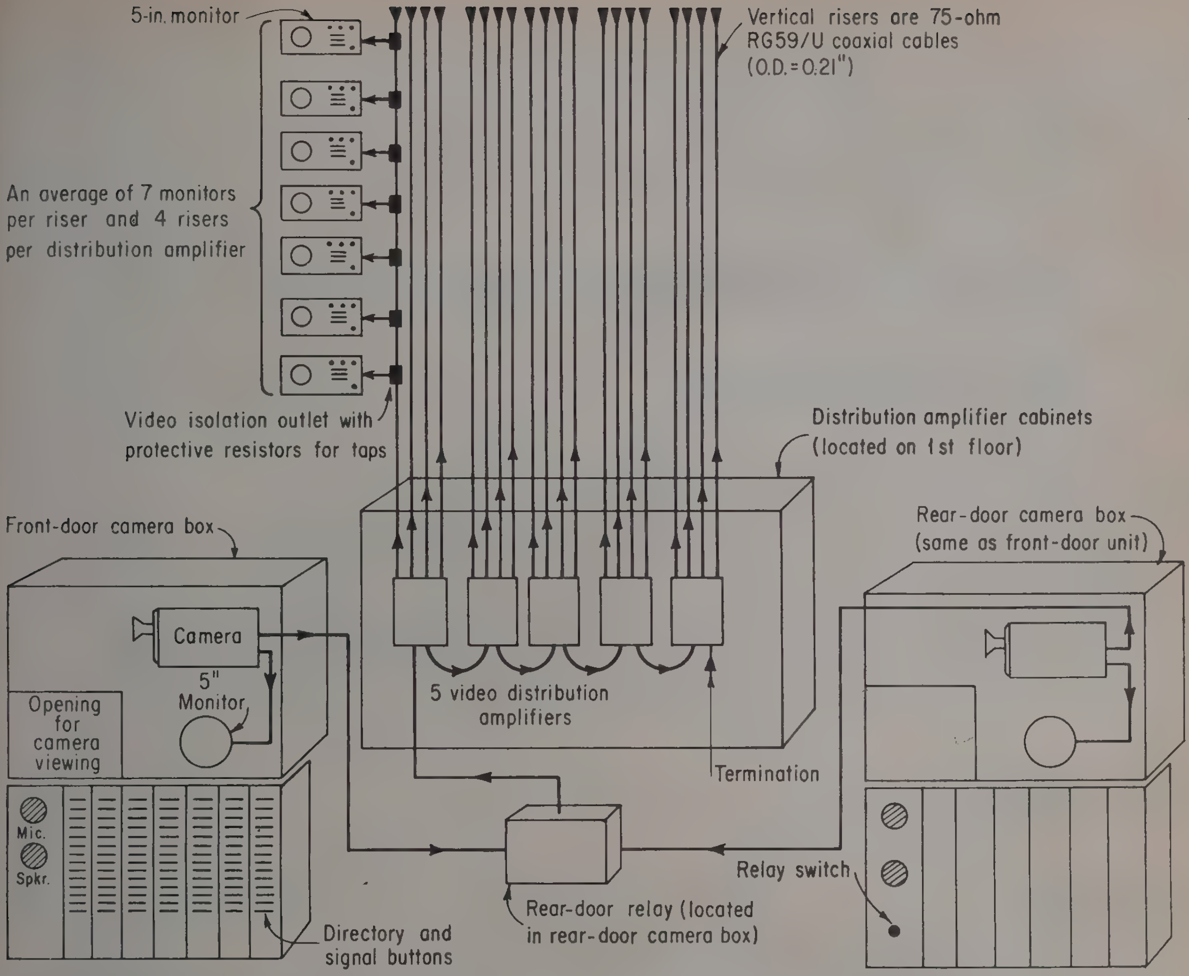

5-in. monitor
Vertical risers are 75-ohm RG59/U coaxial cables (O.D.=0.21")
An average of 7 monitors per riser and 4 risers per distribution amplifier
Video isolation outlet with protective resistors for taps
Distribution amplifier cabinets (located on 1st floor)
Front-door camera box
Rear-door camera box (same as front-door unit)
Camera
5" Monitor
Opening for camera viewing
5 video distribution amplifiers
Termination
Mic.
Spkr.
Relay switch
Rear-door relay (located in rear-door camera box)
Directory and signal buttons

DIAGRAM indicates path that picture signal follows from cameras, through distribution amplifiers, and on to apartment monitors. Five video distribution amplifiers supply 130 monitors. Plug-in connections provide 115-volt supply for cameras, monitors and distribution amplifiers.

In rough-in stages, recessed metal enclosures for the monitors are installed between 2 by 4 wall studs; the integral receptacle is connected to the 115-volt supply; and about 3 ft of slack coaxial cable is provided. When plastering and painting has been completed, the coaxial cable jack is plugged into the monitor. After inserting the monitor plug into the 115-volt receptacle, the outer decorative frame is installed. Finally, the front cover of the monitor chassis is installed and held in place by a key-lock.

Providing a lock on the cover prevents unauthorized persons from tampering with the circuit components of the monitor. In addition, the key-lock arrangement and plug-in connections simplify repairs or replacements, as a serviceman can replace a complete monitor in about two minutes.

Since combination signal, voice and door-control systems contain a rear-entry relay to transfer audio circuits from the front entry, it was only necessary to provide an additional set of auxiliary relay contacts to adapt the closed-circuit TV system to the over-all communication network. As a result, a caller at the rear service entrance must push and hold a relay button on the directory panel to carry on a two-way conversation with an apartment tenant. In addition to shifting audio circuits to the rear directory panel, the relay also transfers the picture signal from the front-door camera to the rear-door camera.

Previously planned, stacked conduit risers for apartment telephone outlets simplified the installation of the TV coaxial-cable risers. Because the outside diameter of the coaxial cables was only 0.21 in., this permitted them to be installed in the same conduit with the telephone cables. Using this technique appreciably reduced installation costs as well as providing additional mechanical protection for the TV cables.

On a unit basis, integrated costs of the TV equipment (cameras, monitors, distribution amplifiers, coaxial cables and other related components)came to about $150 per apartment, exclusive of labor. Labor costs were based on one-man hour per apartment.

By eliminating the employment of doormen (usually for two or three shifts), the initial cost of the closed-circuit TV system can be amortized in a short period of time, according to L. E. Bernstein, the owner of the Duplee Apartments. Bernstein also stated that the TV system immediately caught the eye of prospective tenants and resulted in fast rentals of the apartment units.

Designer for the closed-circuit TV system and equipment was Bell Television Inc., New York City.

Architect-Contractor Relations

By Ray Ashley, *Research and Consulting Engineer, Oak Park, Ill.*

QUESTION: ***Have relations, in general, between architects and electrical contractors greatly improved over the last several years? Are contractors getting better drawings for estimating and construction use?***

ANSWER: ***Yes***

DISCUSSION:

Any uncertainties about contract requirements are sources of friction and trouble between all parties concerned. Several years ago, there were many causes of uncertainty in connection with the ordinary electrical installation. Architects were not specific about job requirements. Contractors frequently were neither careful nor skilled in the preparation of construction plans. Often, the only construction plans were those in the foreman's head.

At the same time, code requirements were limited and often quite vague. Today's advance code regulations do much to aid the architects and help keep contractor bidding uniform.

Time was when plans issued for bidding showed little besides the location, wattage, and switching of outlets. A line between switches and outlets was the extent of the indicated electrical circuiting. Similarly, power plans indicated only the approximate location and size of motors. The contractor figured the size and location of service entrance, feeders, distribution centers, and branch circuiting.

With such limited specifications and inadequate plans, there was no guarantee that there would be any uniformity in the designs of the various contractors figuring the job. For competitive reasons, contractors frequently skimped their designs and the results were really awful.

Any addition requested by the owner after the contract was let often required a change in distri-

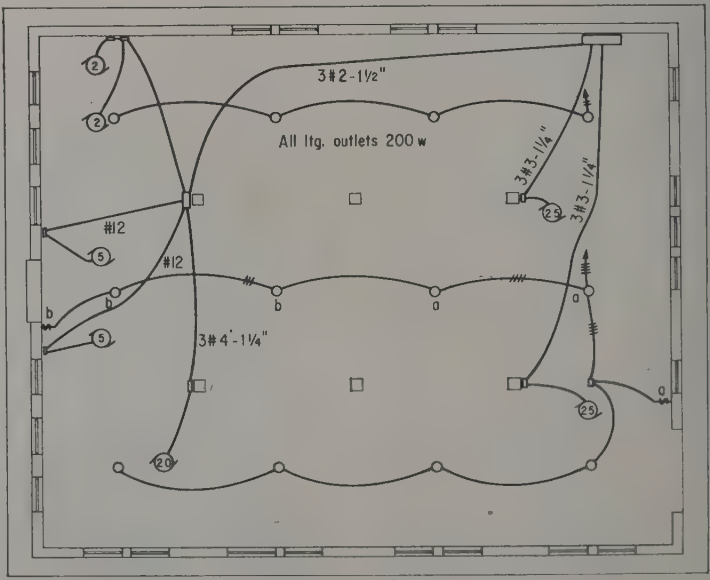


FIG. 1—Circuiting added to drawing showing only outlet and equipment locations reflects contractors' design on which electrical estimate was based. In the past, mechanics had only these sketchy plans as working drawings.

bution centers, feeders, and even service entrance. The addition of a small motor, whose branch-circuit wiring would cost no more than $50, often required feeder and distribution changes costing $300 or more. Not only was the architect shocked at such charges, but he was embarrassed when he had to submit them to the owner.

When charges for extras (additions or changes) were presented, prolonged and heated debates often followed. And the contractor seldom produced his estimate to substantiate his costs. At times, conditions became so strained that the architect vowed never to have that specific contractor on another job. On the next project, a new contractor was involved and conditions were no better.

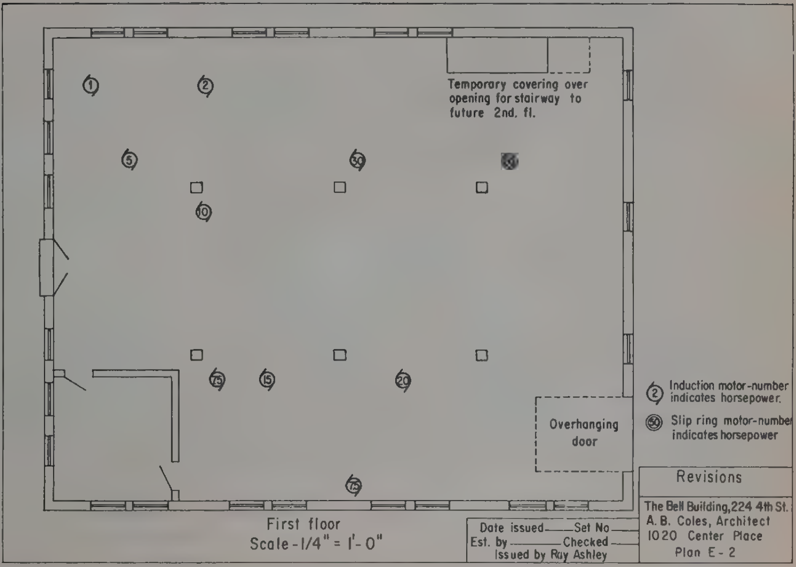

Temporary covering over opening for stairway to future 2nd. fl.
Overhanging door
Induction motor-number indicates horsepower.
Slip ring motor-number indicates horsepower
Revisions
First floor
Scale - 1/4" = 1'- 0"
Date issued
Set No
Est. by
Checked
Issued by Ray Ashley
The Bell Building, 224 4th St.
A. B. Coles, Architect
1020 Center Place
Plan E - 2

FIG. 2—Inadequate plans like this, frequently issued in the past, offer no common base for bidding electrical work. Each bidder had to design a service and distribution system before estimating. Non-uniformity of designs created wide variations in quoted prices.

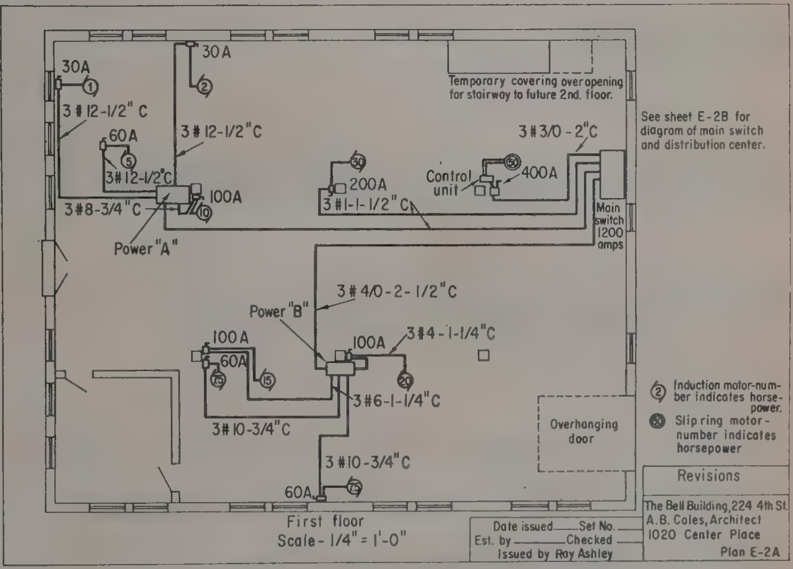


FIG. 3—Complete plans, like this power system layout, are issued today by the better architects; permit contractors to bid on a uniform design; eliminate possibility of future troublesome extras; preclude competitive corner-cutting on design.

Improved Relations

Early experiences were warnings to both architects and contractors that something had to be done. Their combined resolve to remedy the situation, together with changing conditions, resulted in progressive improvement evidenced by the present fine contractor-architect relations.

A number of factors were responsible for this improvement which is based on a better understanding of the problems by all concerned—owner, architect, engineer, and electrical contractor. The following are a few of the more important ones:

Owners have become more familiar with their requirements for electrical work. They also realize that electrical additions are not like machines—something that can be purchased for the same price later on.

Architects have become more experienced in helping owners anticipate future needs; are having their electrical plans prepared by experienced engineers who know how to plan for an owner's future requirements.

Engineers in architects offices are familiar with construction problems and costs.

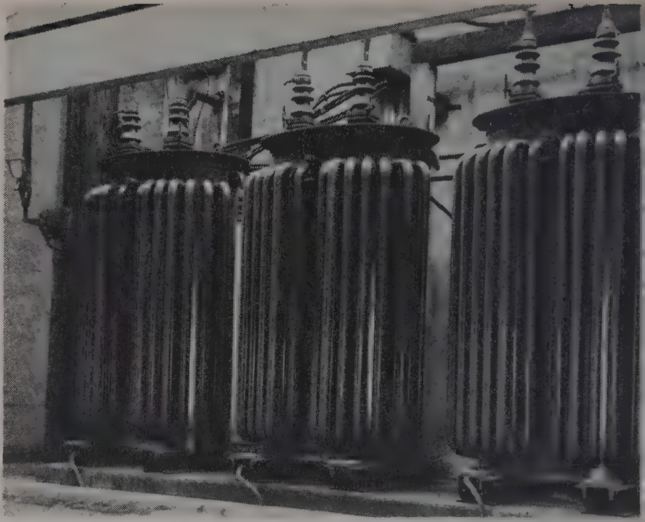
Architects have learned that the lowest bids are not always the best buy.

Electrical contractors, when estimating work, notify the architect of any shortcomings noted in the plans and specifications.

When occasion demands, electrical contractors are ready to substantiate their costs. The days of contractors being able to submit bids below cost and then pull the job out of the hole with extras are past.

Architects and contractors had to learn to work together. Over the years, they have become acquainted with each other's problems and now are better able to avoid disagreeable experiences. However, the electrical contractor never can relax his efforts to inform and convince architects that his costs and problems are different from those of the equipment people or general contractor. For the mutual benefit of all concerned, architects and contractors must continue to work together in the interests of the owner.

MAINTENANCE SCOPE in plant making industrial trucks includes responsibility for motors and lighting, distribution and control equipment, transformers and air compressors, cranes and hoists, electric heating and m-g sets.



PRIMARY POWER AT 12 KV is stepped initially to 440 volts for distribution to load center substations; in this instance, secondaries are carried through sleeves in plant wall directly to . . .

Tested Maintenance Procedures

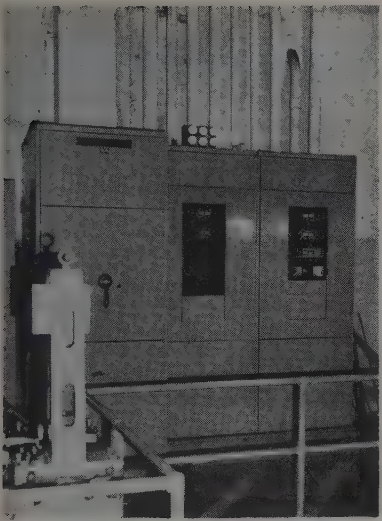
Evolution of a successful industrial maintenance program requires appraisal of facilities and objectives, tempering theory with experience. Here are some practical comments concerning tested inspection routines and motor lubrication, cost evaluation and paper work, plus in-plant responsibility vs outside contracts.

By Svante Eikrem, *Plant Engineer, Hyster Company, Portland, Ore.*

ELECTRICAL maintenance in an expanding industrial plant is an adventure in engineering. For, as production increases in volume and variety, corresponding changes take place in manufacturing processes and materials-handling methods. And, as production equipment is either augmented, altered or relocated, electrical loads and feeder characteristics are affected.

Expanding production likewise involves more and larger motor applications, increased lighting requirements, replacement or relocation of distribution and control components, and more uses for electric heating and welding. This in turn increases the need for reliable maintenance know-how, records and routines. And, as expansion continues, the maintenance supervisor faces additional problems related to job planning and scheduling, personnel training and direction, methods refinement or development, and instrumentation for checking and testing.

This we know from experience. For, over a 3-decade period, our plant has expanded 7-fold; our primary service has graduated from a 220-volt to a 12-kv facility; our expanding production has created constant electrical flux; and our over-all maintenance concept has progressed from an emergency repair to a preventive approach.



MAIN BREAKER and sub-feeder control panels serving one section of the large assembly plant. Located against exterior wall, a few feet from transformers.

UNITIZED CONTROL CENTERS employ ample wiring gutters with feeder breakers and local secondary transformers racked closely adjacent.

MOTOR MAINTENANCE includes annual removal from mount for thorough bench-testing of resistance, disassembly, cleaning and relubrication of bearings.

At the start of this evolution all maintenance was supervised by our toolroom foreman. Today we have a separate engineering department, full-time maintenance supervisor and an independent maintenance division. This transition has witnessed numerous revisions in our thinking concerning distribution, control, operation and maintenance. And, although methods and procedures still are being revised and upgraded, it may be fairly stated that, under our present program, power and production interruptions are negligible and working environs are well lighted, properly heated, conducive to quality craftsmanship and recognized as a factor in furthering plant-wide morale.

With emphasis upon trouble prevention, it is imperative that we understand what to look for, when to inspect (daily, weekly, monthly, yearly), how to proceed (methods and analysis), and why these procedures are practiced. This in turn has prompted us to classify equipment according to type, in some instances dividing a general category into subdivisions. For example, motor maintenance is considered as a triple assignment, including (a) wick-oiled and sleeve bearings, (b) ball bearings and (c) wound-rotor crane motors.

Under the first category, sleeve bearing and wick-oiled motors are lubricated monthly, adding only small amounts of oil to cups or reservoirs to prevent overflow or throwing. In addition, yearly routines include thorough cleaning, removing motors from mountings and taking them to maintenance benches. There they are Megger checked; dismantled; bearings pulled for critical inspection; components air blown and solvent washed (in well-ventilated environs); windings varnished; bearings cleaned in solvent, then relubricated; motors reassembled and replaced on mountings.

Maintenance routines related to crane motors include examination of collector rings and brushes every three months, checking for wear and looking for accumulations of carbon dust from brushes and metal from rings. Insulation is checked at the same time, since carbon dust or metal may have altered resistance values or air gaps. Resistors and drum controllers likewise are examined and checked for general tightness of connections and efficiency of operation.

In connection with lubrication, it is pertinent to comment that years ago whenever we purchased new machines we followed manufacturers' recommendations concerning lubrication. As a result we had to store over 40 different types of oils and greases, and considerable time was wasted in checking specifications, locating specific lubricants for specific machines. After analyzing all lubricant specifications and matching them with products of four major oil companies, we were able to consolidate requirements from 40 to 9 varieties. These were identified by color code; storage was centralized in a specially built vault; one man was placed in charge of all lubrications, and we have obtained gratifying savings in inventory space, lubrication labor, application efficiencies and over-all purchase costs.

Considering office lighting as another maintenance category, we practice group replacement of lamps on a rotational basis. That is, in January of even-numbered years we replace lamps in one of the office sections. In February the scene shifts to another section of the plant, and the entire plant is eventually relamped on a 2-year cycle.

While it is not within the scope of this discussion to detail all maintenance routines related to all categories, it should be noted that our plant maintenance department is responsible for all motors, m-g sets for welding, transformers, distribution and control components, air compressors, cranes and hoists, fire protection equipment, electric heating, steam cleaners and paint booths.

In addition to clearly defined maintenance schedules and procedures, we have adopted numerous ideas to promote effectiveness of our operations. For example:

Six Pointers

1. All items of equipment and machinery are numbered for identification; one set of numbers being used for production tools, another set for auxiliary equipment such as air compressors, air tools, heating units, cranes and hoists, etc. This identification is used for purposes other than maintenance as well, for it facilitates production routing and scheduling, accounting etc.

2. Record cards related to each item of equipment show dates of purchase and installation, initial cost, nameplate data, bearings and parts numbers. Record cards relating to motors are kept separately in convenient Kardex pull-out cabinet file frames as indicated by an accompanying photo. These cards indicate prescribed maintenance frequencies and work to be done, with separate spaces provided to note labor and materials involved, repair costs and comments. Other card categories pertain to classifications such as production equipment, lubrication lists, air tools, cranes and hoists.

3. Requests for maintenance follow prescribed routines, being routed through various department authorities to the maintenance supervisor, and using special report forms that list equipment identification numbers, work to be done or types of faults to be corrected, plus time and material for correction. These forms also are filed.

4. As a result of pre-planned maintenance schedules plus request forms for urgent work, the supervisor plans the day's work and issues necessary assignments to his men. Assignments outline work to be done and estimate time involved for related inspections, lubrication, maintenance or repair of equipment or machinery being considered. When jobs are completed, actual time and variations in materials are noted on work orders, then later transferred to key record cards for subsequent reference.

5. In bonafide emergencies, requests may be made by phone. Then the supervisor is expected to give priority to safety hazards and breakdowns of key equipment, taking men away from other assignments when necessary, but striving to cause minimum disturbances in already-planned programs.

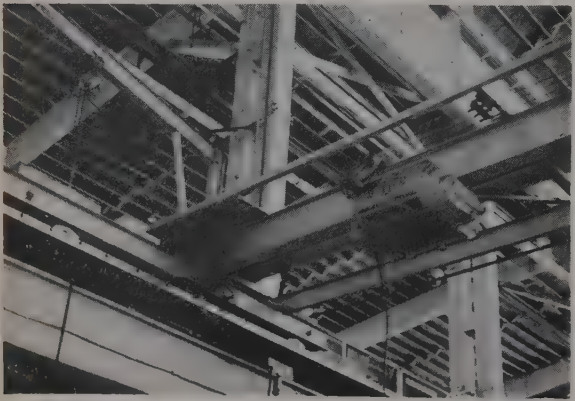
6. Repair costs of major equipment are analyzed annually to determine whether they are reasonable or excessive; this information is then related to major overhaul or replacement programs. When such major repairs or overhauls are approved, they also are performed under the supervision of the maintenance supervisor.

"Outside" Maintenance

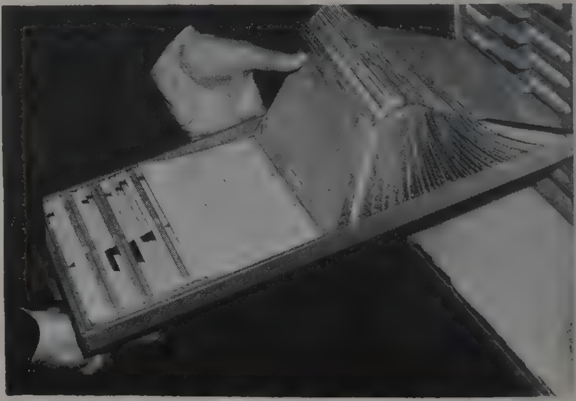
As our experience broadened, we redefined the scope, approach and limitations of our in-plant maintenance department. In so doing, we recognized the wisdom of contracting with outside organizations to perform jobs of a non-routine or specialized nature. This pertains to such assignments as high-voltage line work, filtering oil for transformers, expanding or revising the distribution system, and the like.

In allocating charges related to maintenance we generally consider most costs as "fixed"; that is, not affected too greatly by production volume. With machine tools and equipment, however, we have discovered through the years that costs of maintenance labor and materials are directly proportionate to production labor, in our case amounting to approximately 12%. In reviewing monthly maintenance costs we take this rule-of-thumb into consideration. And, if this percentage is not consistent, we investigate to find out why. This check has proved a reliable signal for abnormalities, and we have been able to detect and correct several faults which, if overlooked or ignored, could have disrupted distribution or production at a later date.

In thinking back to 1929 when our maintenance was supervised by the toolroom foreman, it can be argued that this was not an unreasonable arrangement at that time, because then each item manufactured by us was handmade, job tooling was varied and relatively unsophisticated, and the toolroom foreman was among the few who could relate tool operation to their limitations and electrical requirements. Yet, as an understaffed and overworked individual, he had little opportunity to consider anything except emergency repairs. And, as production growth placed ever-increasing demands upon electrical facilities, it was inevitable that power interruptions were experienced and complaints were heard concerning power and light inade-

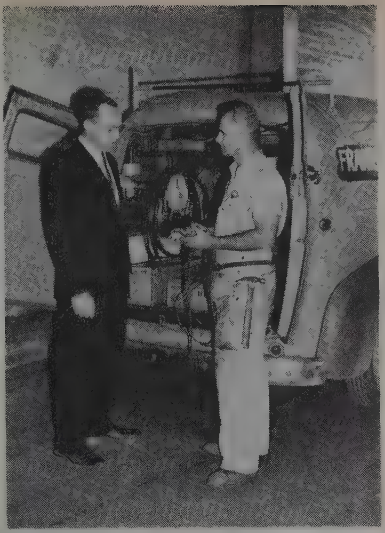


TRAVELING CRANE Feedrail system is semi-enclosed (top and sides) to prevent inadvertent contacts from personnel or from metallic materials or tools dropping off edge of adjacent balcony.

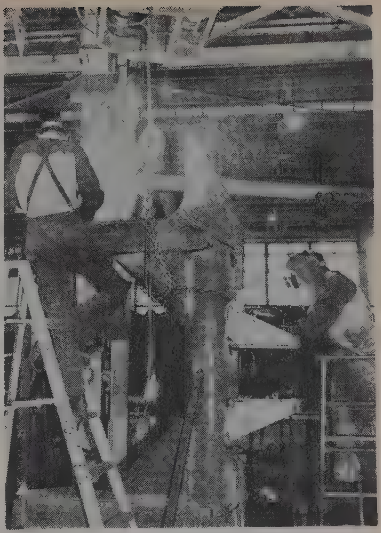


RECORD CARDS are filed conveniently in Kardex cabinets, separate files pertaining to motors, production equipment, air tools, lubrication, cranes and hoists, and information concerning maintenance procedures.

JIB CRANES in considerable quantities facilitate materials-handling routines in all parts of assembly plant, while high-output (3-kw) radiant Calrod heating strips (arrow A) maintain comfortable temperatures for machine operators during periods of cold weather. Note, also, use of reflector lamps (arrow B) mounted above action area to insure critical seeability.



SPECIALIZED AND NON-ROUTINE electrical jobs are performed by "outside" contractors who are equipped with the necessary equipment and know-how to handle such assignments more economically and efficiently than in-plant maintenance crews. Above, the author discusses an upcoming high-voltage wiring job with an employee of Franklin Electric Co., Portland.



WELDING OPERATIONS are backed by numerous motor-generator sets inspected and serviced by maintenance department. Welding likewise entails separate feeders; segregating operational circuit fluctuations from distribution systems-at-large.

quacies due to overloaded feeders and low voltage.

But although "annoying," this deterioration of performance was neither calamitous nor sufficiently disruptive to stimulate corrective actions. As a result, the essential importance of maintenance was not completely appreciated until our war-years defense effort made productive continuity mandatory. Then, with plant facilities strained far beyond designed capacities, maintenance received an urgent endorsement for making plant surveys, analyzing weaknesses and needs, upgrading service and "keeping the wheels turning."

Necessity is Good Argument

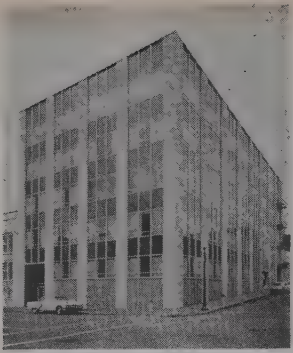
This national emergency provided us with the necessary "argument" to establish a separate engineering department, and immediate steps also were taken to purchase primary power more economically at 12 kv; to step this to 440 volts for basic distribution to load-center substations; to operate larger motors at higher voltages; and to install dry-type secondary transformers as required locally to accommodate 120/208-volt needs. Looking beyond mere "adequacy" for then-existing requirements, all electrical changes were projected for long-range sufficiency. Then, as partial-plan approvals were obtained, feeders and switchgear were installed in desirable depth.

Another major expansion program in 1951 re-emphasized the importance of maintenance, resulting in appointment of a full-time maintenance supervisor and a larger crew of maintenance workers. As the maintenance department jelled and distribution stability improved, emergencies lessened and operating efficiencies climbed to higher levels.

MATERIALS HANDLING within plant naturally includes fleet of battery-operated fork trucks which also are maintained by in-plant crews.

In conclusion it is well to comment upon a healthy maintenance "attitude," because pride in achievement and deserved recognition contributes to efficiency as much as any other item in the cycle of planned inspections, servicing and repair of equipment. Maintenance deserves a status considerably higher than "some kind of janitor" definition, and management can encourage this attitude by holding weekly meetings to coordinate their own thinking and objectives with those of production, engineering and maintenance. Such meetings at our own plant serve to review projects that seem to be lagging, develop a "team" spirit, discuss mutual problems and establish a "meeting of minds" so essential to cooperation and successful plant operation.

This team attitude underlies successful maintenance, in our case resulting in no major breakdowns since the maintenance department was given proper entity, staff and equipment a decade ago to accomplish the job.



MODERNIZED EXTERIOR of old warehouse obtained contemporary appearance by grafting new aluminum and glass skin to stripped original concrete skeleton. Electrical facilities likewise were improved through replacement of utility transformer and addition of new distribution switchgear, busducts, air conditioning and lighting installations.

Warehouse-Office Conversion

Modernization of 30-year-old storage depot and ice plant for commercial use involved installation of new transformer, distribution switchgear, busduct, feeders, lighting and air conditioning. Electrical work was by Edward W. Scott Electric Company of San Francisco.

TWO years ago, owners of an antiquated San Francisco warehouse considered the question of whether to extensively modernize their 30-year-old storage depot or demolish it and construct a completely new office building on the same site. This important decision related to a general redevelopment trend in their section of the city; a trend witnessing the erection of many new buildings that offered commercial occupants modern advantages, which older structures could not match. Therefore, to meet competition, older buildings had the tough decision of either reducing rentals to attract and hold tenants, completely rebuilding, or going all-out in the direction of modernization. In this instance the decision was to modernize; and an inspection of the revitalized 6-story modern structure, which now serves as headquarters for the J. H. Pomeroy Company, indicates that the up-dating program was both extensive and successful.

Electrical modernization began with a thorough survey of existing distribution facilities. This was essential since records and plans were non-existent; circuitry was buried and unmarked in various walls and floor-slabs; hot feeders in several instances terminated in unused junction boxes, and hot circuits served abandoned power outlets. The survey also showed that existing electrical service related primarily to minimum lighting requirements; a basement-based plywood distribution board presented a conglomerate of open wiring, knife-blade switches and unmatched meters; a small utility transformer was inconveniently located in a vault outside the building proper beneath the sidewalk; the bus structure in the freight elevator control panel served three additional unidentified feeders; these feeders were found dead-ended in remote unused panel enclosures, and "protective" fuses were generally rated well above circuit limitations.

After tracing this circuitry and related equipment, basic drawings were prepared to record conductor sizes, types and capacities of protective means, condition of old insulation, extent and nature of loads served, and which items could be retained for continued use, safely and effectively.

This basic plan was then equated to facilities ultimately desired, what additional circuitry and control means were needed, and what new items of equipment would provide the desired combination of adequacy, functionalism and economy.

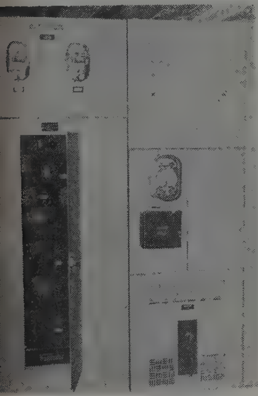
In this process, many existing feeders beyond the point of salvage were removed. Other conduit runs proved to be adequately sized and desirably located, although existing wiring had to be replaced by heavier conductors having newer, thinner insulation.

The old fused distribution board was replaced by new metalclad low-voltage breaker switchgear, while a new 120/208-volt 3-phase service entrance was installed with a 1600-amp main breaker plus six sub-feeder breakers rated variously at 600, 400, 200, two at 175, and 100 amps. Although it was possible to salvage existing power feeders serving elevators and the upper two floors, it was necessary to extend a completely new feeder to a roof-based 45-ton air-conditioning unit. And, to serve loads in the basement and floors one through four, a new 600-amp low-impedance aluminum busduct was selected due to considerations of capacity, flexibility, maintenance and economical installation. This busduct is a 3-phase 4-bar full-neutral assembly; ventilated where sections are horizontal, and enclosed where vertical.

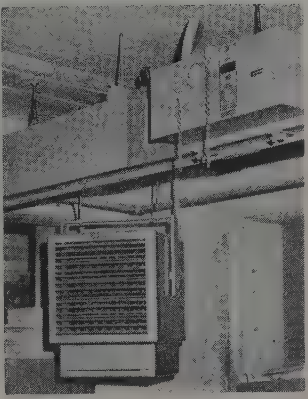
Lighting was another major consideration in this modernization project. Selection of fixtures, spacing, and lamp arrangement were dictated by the various areas in question. This approach resulted in levels of illumination varying with function and activities, ranging from a high of 200-fc in drafting and engineering offices, to 100-fc in general office sections and reception rooms, to 50-fc in lobbies and service areas. Selection of fixtures, coves and luminous ceilings were likewise dictated by area function; with aesthetics emphasized in public areas and offices of officials, and with commercial luminaires installed in general offices.

REVAMPED LOBBY gains impression of spaciousness from full-width high-intensity luminous paneling that extends over high-ceilinged foyer and balcony. Modernization of old building also included up-dating and pushbutton control for one passenger car plus addition of a complete second unit.

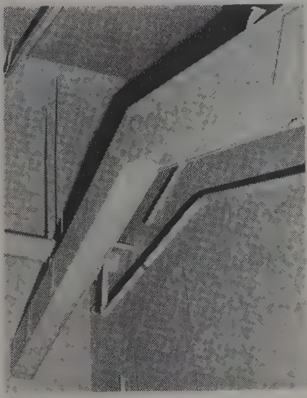
RECEPTION LOBBY, fully air conditioned and evenly illuminated to 100-fc intensity by 12- by 24-ft bank of top-lighted plastic panels, reflects dramatic transition of office building from original storage warehouse. Decor is enhanced by liberal use of accent lights and other materials.



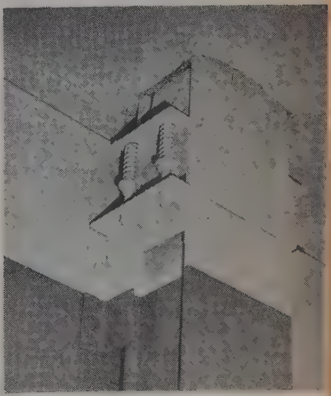
NEW SWITCHBOARD contains 1600-amp main breaker plus tierred feeder breakers related to busduct riser and additional cable-in-conduit power circuits. Where office space is occupied by separate tenants, submetering is installed.



PLUG-IN CIRCUIT BREAKERS are installed in 600-amp busduct merely by pushing cover plates to one side, then inserting breaker stabs to establish direct connections with busbars. With this flexible take-off arrangement, local loads obtain protection wherever connected or relocated along this feeder line.



RUGGED CONSTRUCTION of original building influenced design engineers to bypass major structural bearing walls wherever possible. Therefore, as indicated by this photo, busduct was inclined above stairwell, then offset horizontally and vertically to follow route involving minimum amount of cutting or drilling.



SPRING-LOADED SUSPENSION cushions vertical busduct sections against possible vibrations and earth tremors. Note method of securing angles to wall brackets by welding, and to floating duct riser by bolts, with compression coils added.

Design standards used for basic power planning included a basic 3 watts per sq ft for general lighting, plus weighted increments for local illumination, portable electric equipment, general receptacles, air conditioning and elevators. A 25% allowance was then added to take care of possible future increases in electrical use. And, in addition, selection of main switchgear reflected the possibility of later adding two more floors on top of the present structure.

Another major problem pertained to air conditioning; since large unobstructed areas of the warehouse had been ventilated previously merely by opening windows and connecting portable fans during summer months, and connecting portable heaters for local warmth in the winter. With the building's conversion to office use, however, open windows and unobstructed areas were ruled out. And, due to higher levels of lighting, greater numbers of people involved and the partitioning of space into numerous smaller areas, it was essential to consider large-volume air tempering, circulation and removal.

These requirements were satisfied by installing circulation fans on each floor adjacent to existing pipe chases, with dual-service heating and cooling coils installed for various zoned sections at points where zone-related supply ducts connect to fan discharge plenums. Air is returned to fan rooms by way of suspended ceiling cavities. Recirculated air is freshened by air introduced through a central duct from a roof-based filtered intake, while approximately 75% of primary air is removed from the building through restroom exhausts. Air is cooled and dehumidified to provide humidity control, to compensate for internal latent loads and to eliminate condensation on zone coils. Air in the building is also maintained at a slight positive pressure to lessen uncontrolled infiltration with its related heating and cooling increments.

The over-all result is an ultra-satisfactory solution for converting a heavy warehouse shell into a modern commercial property; the electrical work being performed by the Edward W. Scott Electric Company, San Francisco. Architectural features were designed by J. L. Stetman, La Canada, Calif., while general engineering and contracting was performed by J. H. Pomeroy Company.

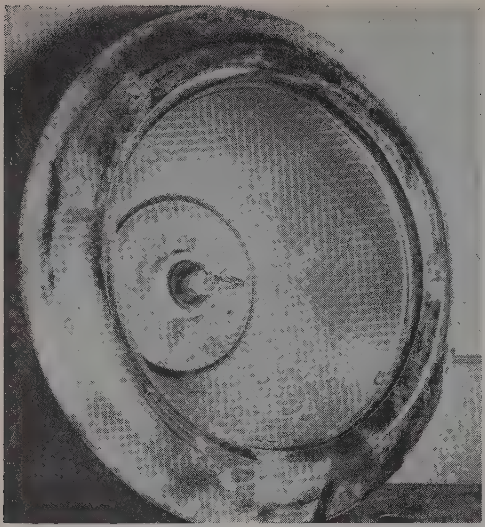


FIG. 1—Front view of defective lamp.

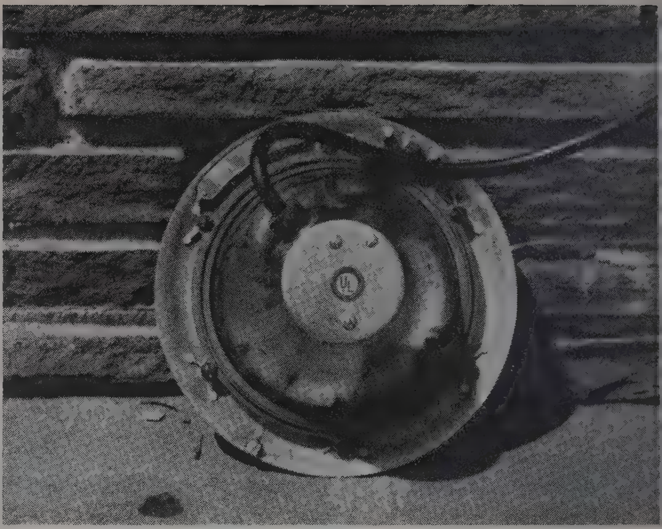


FIG. 2—Back view of defective lamp.

Grounding and maintenance are safety essentials for . . .

Pool Lighting At 120 Volts

Here's a detailed report of an investigation to determine the causes of and remedies for electric shock in swimming pools with submerged 120-volt lighting.

By W. P. Taylor, *Senior Engineer of the Electric Test Department,*
and
R. J. Arthur, Sr., *General Foreman, Meter and Installation Department,*
Baltimore Gas and Electric Company, Baltimore, Md.

SUBMERGED lighting fixtures in swimming pools are watertight metal enclosures with glass lenses. In case of leakage, water coming in contact with exposed energized electrical parts creates a potential gradient in the water adjacent to the fixture. Tests were conducted in a conventional pool during July, 1961, intentionally using a defective submerged lighting fixture and the simulated body of a swimmer to verify laboratory and field tests made during 1960. Our laboratory and field tests, with water in contact with exposed energized electrical parts, demonstrated that (a) the potential gradient was negligible when the fixture metal enclosure was effectively grounded, and (b) dangerous potential gradients in the water resulted when the enclosure was ungrounded.

The pool is 40-ft long by 18-ft wide with water depths ranging from 3 ft to 8½ ft. There are connecting wading pools at each corner of the shallow end. There are two submerged lighting fixtures, one in the center of each end, installed in wet niches 2 ft below water level.

Metallic ground points in the pool consisted of one drain in the bottom at the 8½ ft depth; six circulating pipe inlets, one in each wading pool, two on each side of the main pool, 6 ft from each end and 1½ ft below water level; and the underwater lighting fixture in the opposite end from where tests were being conducted. Two years ago this pool was filled with Baltimore City water which is continuously recirculated through a filter and is chlorinated to two parts per million. The water had a pH of 7.6 and a measured resistance of 1400 ohms/centimeter.

Details of Lighting Fixture

The lighting fixture used for test purposes was a standard 300-watt size, with conical shaped metal enclosure or shell, 7 in. in diameter at the lens, and an ornamental metal rim. Total metallic area of the fixture in contact with water was calculated to be 1¾ sq ft. The glass lens was removed and the 300-watt lamp was broken, exposing the filament and filament supports to the water. Details of the fixture are shown in Figs. 1, 2, and 3. The lamp filament was energized but open circuited. Switching was arranged to either energize, de-energize, or

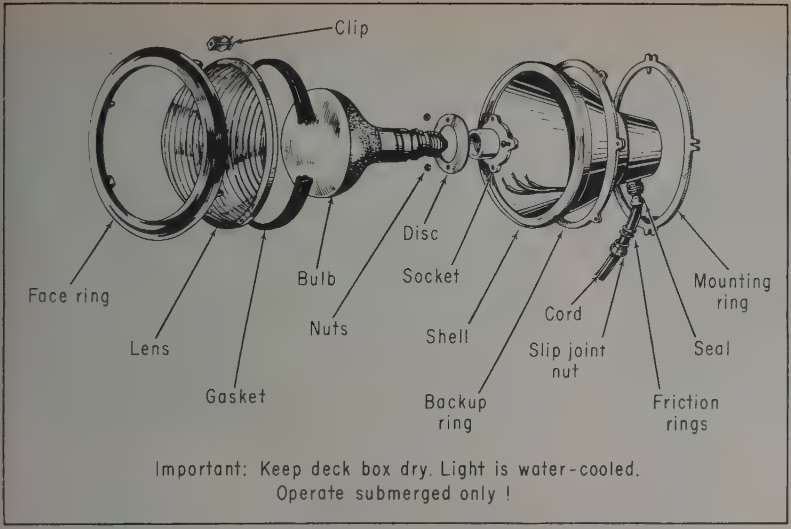


FIG. 3—Exploded view of fixture.

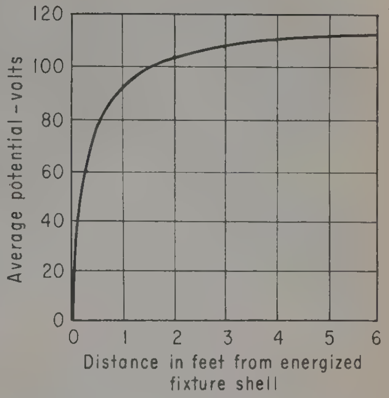


FIG. 4—Potential between energized fixture shell and submerged electrode.

ground the fixture shell. The majority of tests were made with one side of the filament and the shell energized, but no ground return from the filament.

Potential Gradients

Potential checks were made between the energized fixture shell and a submerged cylindrical brass electrode 5-in. long and 11-in. in diameter. Potentials were measured with a special ac transistor voltmeter having an input resistance of two megohms.

With the submerged fixture shell and filament both energized, the potential gradient between the fixture and the submerged brass electrode increased rapidly as the distance from the fixture to the electrode was increased. At a point 2 ft from the fixture over 90% of the supply voltage was measured. Fig. 4 shows an average of readings taken with the defective fixture mounted alternately at the shallow and deep ends of the pool, in line with the fixture, perpendicular to the wall supporting the fixture, with the submerged brass electrode at the various distances shown on the graph. Readings were also taken on a line between the fixture and the nearest grounded inlet pipe, with generally similar results.

With the fixture shell effectively grounded and the exposed filament energized, a potential of only 0.8 volt was measured between the fixture and the electrode 6 in. in front of fixture. Compared with Fig. 4, this indicates the safety afforded by effective grounding.

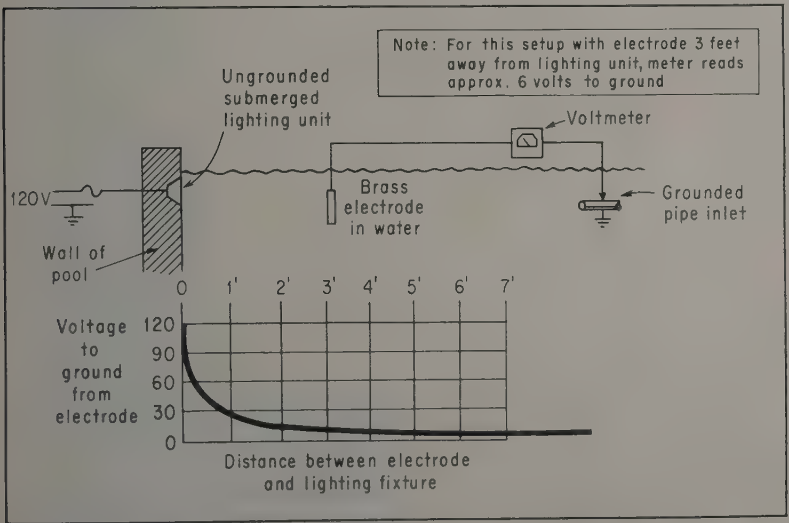

Note: For this setup with electrode 3 feet away from lighting unit, meter reads approx. 6 volts to ground
Ungrounded submerged lighting unit
Voltmeter
120V
Brass electrode in water
Grounded pipe inlet
Wall of pool
0
1'
2'
3'
4'
5'
6'
7'
Voltage to ground from electrode
120
90
60
30
0
Distance between electrode and lighting fixture

FIG. 5—Potential to ground from electrode at various distances from the energized lighting unit.

Potential gradients were also measured between the submerged brass electrode and a grounded pipe inlet, Fig. 5. Readings with the electrode at $\frac{1}{2}$ ft and 3 ft in front of the energized fixture averaged 36 volts and 6 volts respectively. These potentials correspond to the differences between the voltages shown in Fig. 4 and the supply voltage.

Current Measurements

In order to obtain some indication of the currents which could pass through a person under the measured potential gradients, a simulated body was constructed with two, 6-in. radius, four-blade aluminum electrodes with centers $2\frac{1}{2}$ ft apart supported on an insulating rod. Each electrode had an area of 3 sq ft, one approximating the area of the legs, and the other the arms plus head, of a human body. Insulated conductors connected these electrodes to a milliammeter with variable resistance in series. Fig. 6 shows the simulated body, and Fig. 7 shows this device submerged in the test position.

Current readings were taken with a 0-150 scale milliammeter having 7 ohms internal resistance and a 100-ohm resistor in series, giving a total of 107 ohms between the electrodes, unless otherwise noted.

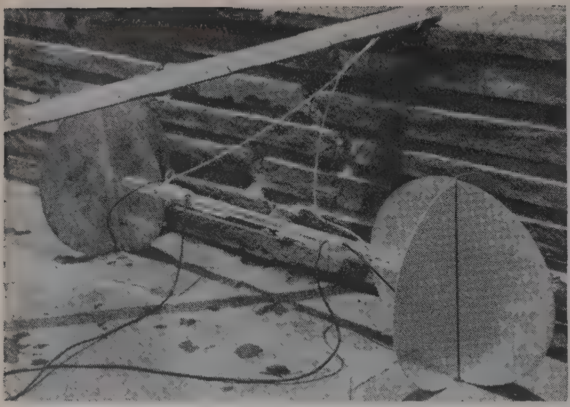


FIG. 6—Simulated body.

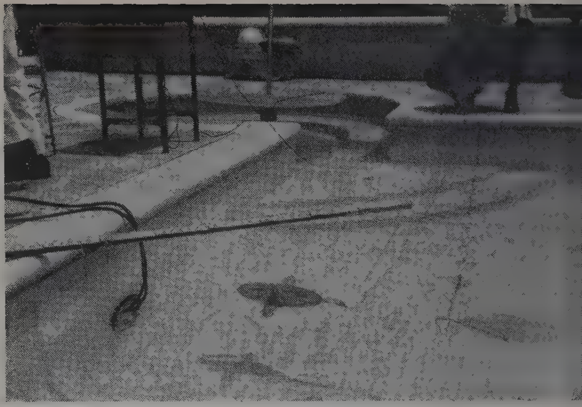


FIG. 7—Simulated body in test position.

Some low-voltage laboratory measurements, made by the ohmmeter method, indicate that the resistance of an adult, from hands to legs, with legs immersed in water, may be of the order of magnitude of 300 ohms. We estimate total immersion may reduce the lengthwise resistance of a human body to 100 ohms. We were unable to find any literature giving the resistance value of a totally submerged human body.

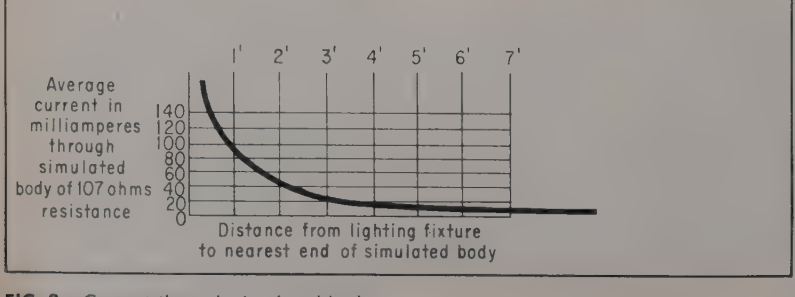
Tests with the simulated body submerged indicate that dangerous currents could be passed if the fixture shell becomes ungrounded, whether or not it is also energized. Fig. 8 shows the average current between the aluminum electrodes while submerged at various distances from the energized fixture shell. One test, made with 17 ohms in the simulated body instead of 107 ohms, at 2 ft in front of the fixture, increased the reading from 45 milliamperes (as shown on the curve) to 140 milliamperes. It is difficult to say at what distance from a defective fixture a lethal current would be encountered. A current of 100 milliamperes is reported to cause fibrillation of the human heart.

The safety afforded by effectively grounding the fixture shell was checked by energizing the exposed filament and placing one end of the simulated body within ½ in. of the fixture. In this position we measured 5 milliamperes with 107 ohms in the simulated body and 30 milliamperes with 17 ohms in the body.

Wiring Recommendations

The wiring installation should include a separate grounding conductor of adequate capacity so that the circuit overcurrent device will operate in event of an electrical fault. This conductor should be continuous throughout the entire system and should be connected to the same grounding electrode as the service ground. All non-current-carrying metallic devices should be bonded to this grounding conductor. Where metallic raceways are used, the ground continuity of such raceways cannot be relied upon for proper operation of overcurrent devices because of high-resistance joints caused by corrosion. (Resistances checked across individual ½ in. EMT couplings, exposed to chlorinated water for two years, were between 50 and 150 ohms.)

Furthermore the flexible cord which connects the fixture should be of the shielded type or be enclosed in an effectively grounded flexible metallic raceway. (This will prevent potential gradients in the water in event of insulation failure.) All energized joints and splices in junction boxes exposed to water should be insulated with self-vulcanizing splicing compound and taped to provide *watertight* joints. Gaskets on all watertight devices should be properly maintained.



Note: For this setup with simulated body 2 feet from energized fixture approx. 45 milliamperes flows through body

FIG. 8—Current through simulated body.

Conclusions

Our tests have shown that dangerous potentials can exist and currents generally considered lethal can be encountered by a swimmer near a defective 120-volt underwater light. Tests also indicate that underwater lighting can remain safe even though water may come in contact with live parts, provided that all metallic non-current-carrying parts of the wiring system are effectively grounded and properly maintained.

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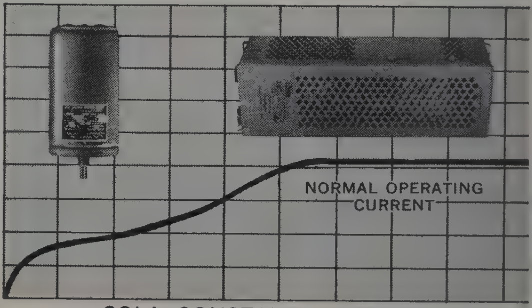

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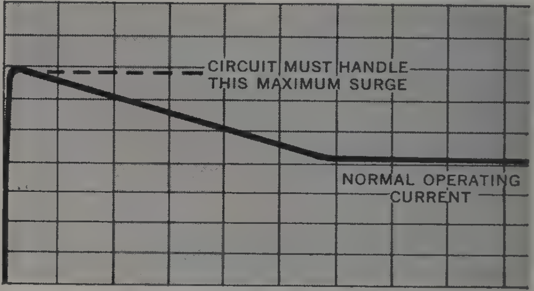

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S-34-61

Colored Conduit Used in Hot Strip Mill

Factory-colored red steel conduits identify electrical systems in River Rouge, Mich., installation.

COLOR-CODED conduit is being given its most extensive use to date in the 80-in. hot strip mill constructed at River Rouge, Mich., for Great Lakes Steel Corporation, a division of National Steel Corporation. Harlan-Triangle Electric Companies, Detroit, a joint venture by the Harlan Electric Company and the Triangle Electric Company, are the electrical contractors for this giant project.

As much of the conduit was to be installed in high bay areas, 50 ft above the floor, or in tight clusters of bends and groups of runs, painting it after installation would have been a very costly and time-consuming operation, with the possibility of injury to the painters involved. However, the exact color desired was available in the color-coded Sherarduct conduit introduced recently by National Electric Division, H. K. Porter Company, Inc., located in Pittsburgh, Pa.

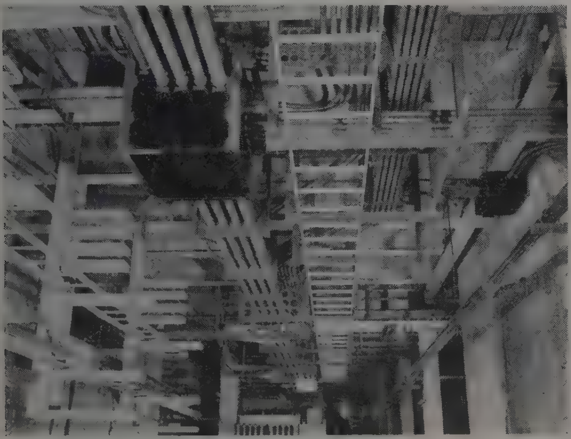
The order called for 1,500,000 lbs of the red conduit, in sizes ranging from ¾ in. to 4 in. The color is applied to the conduit in the manufacturing process. After pickling, rigid steel conduit is galvanized by the Sherardizing process, in which zinc is alloyed to the conduit walls and threaded ends. It is then immersed in a bath of corrosion-resisting MVC-1 Poly-Vinyl, to which the color pigments have been added, and moved slowly through ovens in which the finish is baked dry and hard.

Fork Lift Handling

For the Great Lakes Steel Corporation Plant, the conduit was shipped on flat bed trucks in bundles of 2,000 lbs, loaded on 4 by 4 beams for fork lift handling. This kept unloading time at a minimum. Approximately 25% of the conduit was bent at the job site for installation.

Work on the Great Lakes Steel mill was started in March 1960, and completed in September 1961. Described as the world's fastest and most powerful strip mill, it has a capacity of 3,600,000 tons a year. Operations are entirely programmed and regulated by an electronic computer system.

Located on a 92-acre site near Detroit, the mill occupies a group of buildings, in which steel slabs up to 12-in. thick are rolled into thin strip steel and put into coils ready for other processing. One indication of the importance of electricity in the mill is the fact that a motor room 70 ft wide and 1176 ft long is required to house the drive motors, gear sets, motor generator sets, switchgear, and control equipment.



SOME of the variety of electrical materials used in the new 80-in. hot strip mill at River Rouge, Mich., built for Great Lakes Steel Corporation. The conduit is bright red color-coded. In center is a tray for carrying high-voltage cables. The large bank of conduits at the right is four runs deep and five wide.

WILLIAM P. HILL, right, vice president of National Steel Corporation, checks the electrical specifications for the 80-in. hot strip mill. With him are, from left, Donald McFadden and C. A. Harlan, of the Harlan-Triangle Electric Companies, the electrical contractors. Rising behind the men are bright red runs of color-coded Sherarduct conduit.

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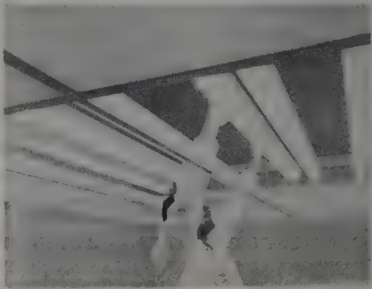
Laboratory Evaluates Luminous Ceilings

In order to evaluate on-the-job lighting conditions related to proposed commercial, industrial and residential areas, an unusual laboratory has been established in Berkeley, Calif. This lab contains three adjustable overhead components, each one working independently. First, a simulated actual ceiling can be adjusted for a maximum height of 16 ft, thereby recreating conditions which will effect lighting design problems. This mockup includes adjustable beams, pipes and ductworks. Second, adjustable lamp racks permit use of any selected combination of lamps, so that lighting levels ranging up to 500-fc can be obtained if so desired. And third, suspended T-bar framework elements can support all types of luminous ceiling materials, such as translucent panels or metal or plastic louvers ar-

LABORATORY designed to evaluate luminous ceilings has several adjustable elements, as indicated by above photo showing T-bar grid-work supporting luminous panels raised to height of 16 ft, while lamp racks have been lowered near upper surface of translucent plane.



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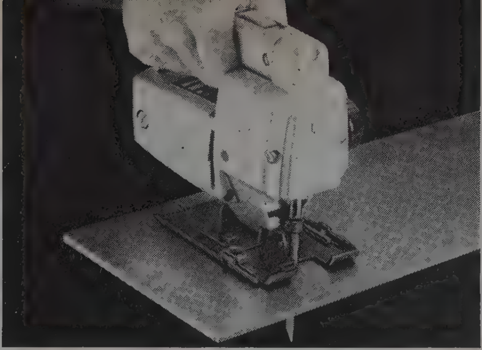

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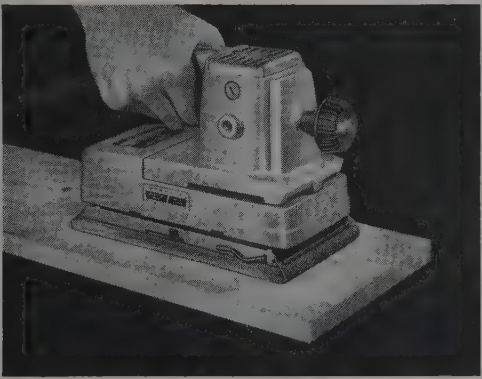

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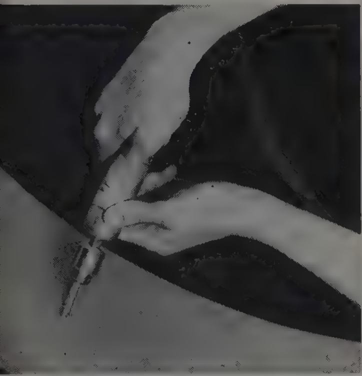

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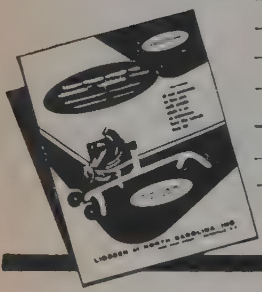

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CEILING LEVEL is lowered and lamp racks are raised in order to accurately measure and study panel brightness values and evenness of light diffusion between rows of lamps. Note window of control booth containing grid rack and dimming regulation equipment.

ACCURATE DETERMINATION of coefficients of utilization also dictates comparison of different types of panels such as translucent sheets or metal or plastic louvers.

ranged in various configurations. In an adjacent room, photometric instrumentation and control mechanisms permit rapid adjustment and accurate measurement of possible room dimensions, ceiling features and possible combinations of light sources, diffusing or shielding.

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		Min.	Max.	Min.	Max.					
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	1/2	.622	.642	.820	.840	7	200	70	1000	365
	3/4	.820	.840	1.030	1.050	10	150	70	850	420
	1	1.041	1.066	1.290	1.315	13	100	90	600	525
	1 1/4	1.380	1.410	1.630	1.660	16	50	70	375	430
TYPE EF	3/8	.485	.505	.690	.710	4	250	60	1500	390
	1/2	.620	.640	.820	.840	5	200	60	1000	325
	3/4	.815	.835	1.030	1.050	6	175	70	850	375
	1	1.030	1.055	1.290	1.315	8	100	60	600	420
	1 1/4	1.370	1.395	1.635	1.660	9	100	80	375	360
	1 1/2	1.575	1.600	1.875	1.900	11	50	55		
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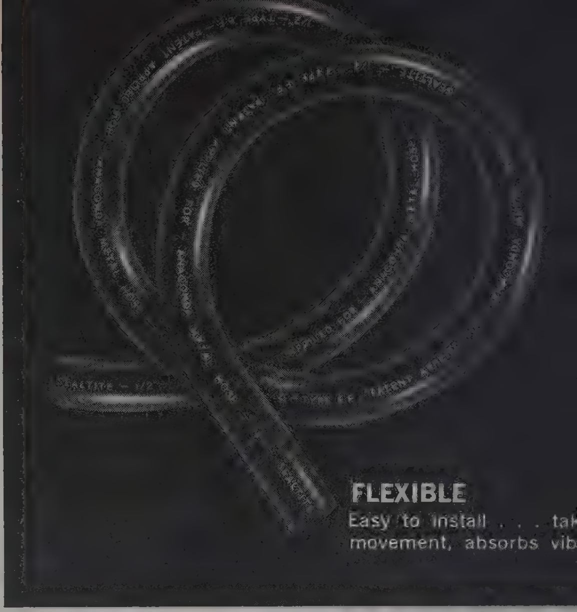
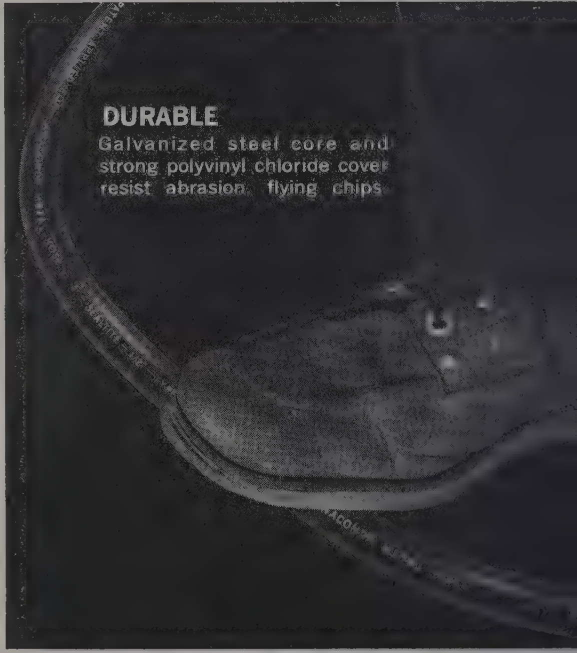


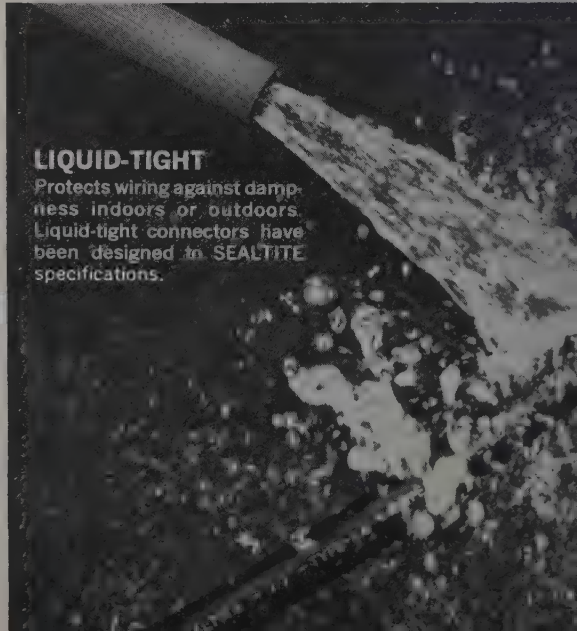
FLEXIBLE

Easy to install . . . tak
movement, absorbs vib



DURABLE

Galvanized steel core and strong polyvinyl chloride cover resist abrasion, flying chips



LIQUID-TIGHT

Protects wiring against dampness indoors or outdoors. Liquid-tight connectors have been designed to SEALTITE specifications.

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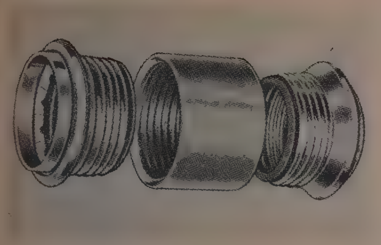
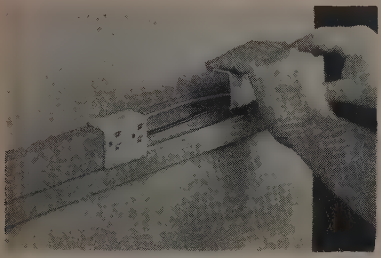
Product News



Fittings (1)

A new line of insulated, bushed, raintight Tap-On EMT fittings has been added to this line. New fittings are now available in ½-in. and ¾-in. connectors and couplings, UL listed as raintight, and will be ideal for outdoor raceways and wherever EMT is allowed. Tap-On fittings can be used for all situations indoors and out.

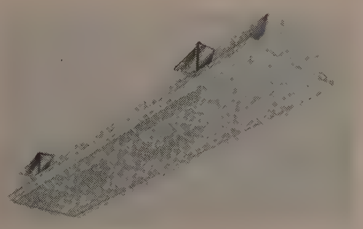
Tomic Sales & Engineering Co., 20000 Sherwood, Detroit 34, Mich.



Wiring (2)

G-E Flexway wiring is a new way of wiring industrial plants, commercial buildings and houses. Flexway is a metal, surface-raceway, wiring system for new construction as well as in modernization and maintenance work. Where desirable, it can be installed as a wall chair-rail or mounted on benches or near machines to provide electrical capacity. Components of the system include 15-amp 125/277-volt switches; 15- or 20-amp 125-volt and 15-amp 250-volt grounding outlets that can be split for two-circuit or split-controlled outlets. Outlets and switches are designed to mount in the raceway at any desired spacing or location. Outlets feature insulation-piercing terminals that make firm electrical connections to No. 12 or 14 AWG wires without removing insulation and to No. 10 AWG wire by stripping the insulation. All outlets are automatically grounded to metal raceway which provides for carrying ground connection through splices and fittings. Where required, a separate grounding wire can be connected to green hexagon grounding screws on each outlet. System has ample capacity for a range of wire sizes from ten No. 10 AWG wires to three No. 6 AWG wires. Listed by UL.

General Electric Co., 95 Hathaway St., Providence 7, R. I.



Troffer Lighting (3)

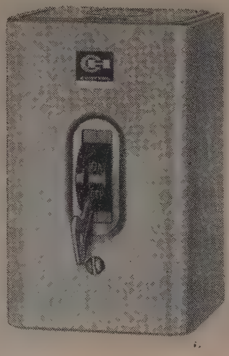
A new line of recessed troffer lighting, called Imperiale, has been introduced. Wing-Lok mounting devices permit fixtures to be snapped in place by pushing into ceiling opening. Imperiale can also be removed for relocation. A door of 18-gauge steel encloses the shielding. Door hinges from either side. Other features are full width polyurethane gasketing and extra large knockout to speed wiring. All steel parts are Bonderized. Available in 14 specially engineered shieldings. Troffer is available for most basic ceiling constructions.

Litecraft Manufacturing Corp., 100 *Dayton Ave., Passaic, N. J.*

Cables (4)

Multiple-conductor Bronco asbestos-insulated Type AVA control cables for operation in temperatures as high as 110°C (230°F) are now offered in sizes 12 and 9 AWG with up to 19 conductors. The insulation over each coated, stranded copper conductor has four components. There is first a layer of felted, impregnated asbestos; then a layer of varnished cambric; a wall of felted, impregnated asbestos; a color-coded cotton braid. Sandwiching the cambric between the asbestos seals it from heat, flame, and oxidation. A binder of cable tape is wrapped over the cabled conductors. Over-all is placed a closely woven asbestos yarn braid which is impregnated with a flame, heat and moisture resisting insulating compound. Catalog is available.

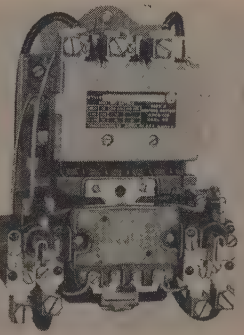
Western Insulated Wire Company, 2425 *East* 30*th St., Los Angeles* 58, *Calif.*



Devices (5)

Key and lever operated fractional horsepower devices have been added to this line of ac manual starters and regulators. These new additions provide 1 and 2 pole, across-the-line startings as well as overload protection for fractional hp motors driving small machine tools, fans, blowers, etc. Lever operated device, available in a NEMA 1 enclosure or as an open unit, provides remote operation by a shipper rod or a machine driven linkage. Open type starter will fit a standard surface or flush type outlet box.

Cutler-Hammer, 315 *North* 12*th St., Milwaukee* 1, *Wis.*

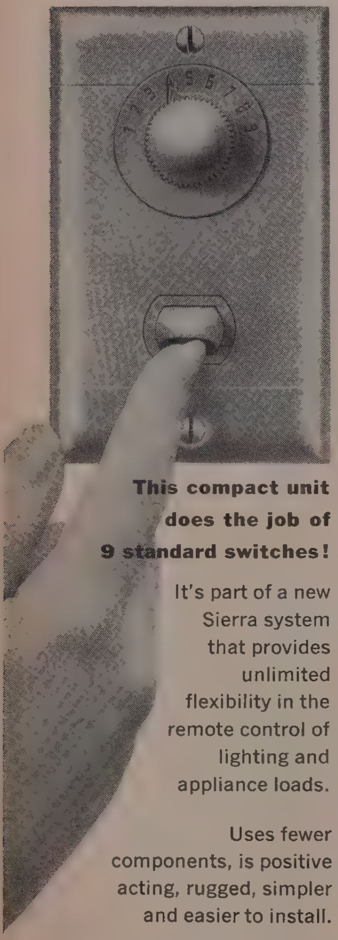


Magnetic Starter (6)

A redesigned Size 3 magnetic starter provides more wiring room. Available for 2-, 3- or 4-pole applications, it incorporates the new inherently trip-free thermal overload relay with visual trip indicators. A simplified electro-magnet design includes encapsulated magnet coil with built-in terminals. Dual-voltage dual-frequency coils are standard to match 110/220 and 220/440-volt 50- or 60-cycle motor applications. Bulletin 14-B3 is available.

Furnas Electric Company, 1067 *McKee St., Batavia, Ill.*

SIERRA REMOTE CONTROL WIRING



This compact unit does the job of 9 standard switches!

It's part of a new Sierra system that provides unlimited flexibility in the remote control of lighting and appliance loads.

Uses fewer components, is positive acting, rugged, simpler and easier to install.

Adds value far beyond its low cost. Write for details today.

SIERRA ELECTRIC CORPORATION
15100 SOUTH FIGUEROA STREET
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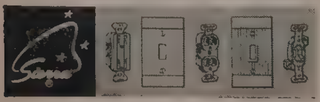
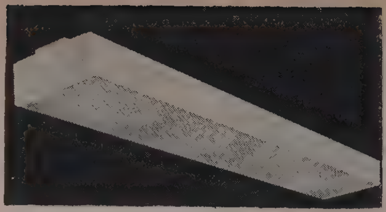
Write for more information and catalog





Fluorescent Fixture (7)

A new general purpose commercial fluorescent luminaire, called the Cleer-vue, was designed to blend with many architectural motifs. It is completely luminous, with an Opti-Kube prismatic lens on the bottom and plastic panels on the sides. A surface-mounted unit, it can be installed either singly or in continuous rows. Available in 4- or 8-ft lengths, the one-piece enclosure may be opened from either side.

Westinghouse Lighting Division, Edgewater Park, Cleveland, Ohio

Time Switch (8)

A new line of astronomic dial time switches, known as Intermatic V25000 Series, is designed to permit automatic control of night lighting in relation to the rising and setting of the sun. It turns lights On at sunset and Off at sunrise, or any other pre-selected time. Available in 120- or 240-volt, DPST or SPDT switch, these models are each tungsten-rated at 40 amps per pole and powered by a heavy-duty, industrial-type timing motor for operation in extremes of heat or cold. Bulletin NR-91 is available.

International Register Company, 2624 W. Washington Blvd., Chicago 12, Ill.

Tool (9)

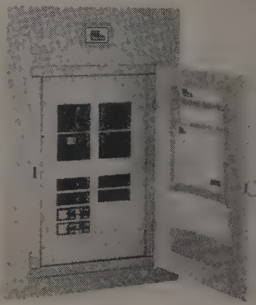
A manually operated hand tool, Catalog No. 10700, for crimping "proprietary" and MS pin and socket contacts of various manufacturers is now available. An adjustable stud controls crimping depth and point of cycle release for size of contact and range of wire sizes being connected. A replaceable blank contact locator is supplied with tool. This locator can be drilled to position a specific size and type of contact.

Buchanan Electrical Products Corp., Hillside, N. J.

Conduit Hanger Assembly (10)

A new assembly unit designed to provide in one unit a beam clamp and conduit hanger. Assembly is made in two beam sizes—one to fit a steel flange ½ in. through ¼ in., the other $\frac{5}{16}$ in. through ½ in. Assemblies are available for use with ½-in., ¾-in. and 1-in. thin, rigid and aluminum conduit. Bracket or flange portion of assembly is available as a separate unit and provides a ¼-in.-20 thread impression which enables contractor to install conduit boxes flush to underside of steel beam.

Gat Division, Erico Products, Inc., Cleveland, Ohio



Load Centers (11)

Two new split-bus units, 3-and-6 and 4-and-6, have been added to this line. No. LC712D is equipped with three double poles in top power section and six single-pole circuits in the lower lighting and appliance section. No. LC714D has four double poles in top and six singles in bottom. Both units are available in surface and flush indoor enclosures and raintight boxes. Each lighting and appliance section will accommodate any combination of single, double or duplex circuit breakers. They are rated at 125 amps, single phase, 3-wire, 120/240 volts ac. They are UL listed as service-entrance equipment when the six disconnect rule is not exceeded, and conform to non-interchangeable requirements of the NEC.

Murray Manufacturing Corp., 1250 Atlantic Ave., Brooklyn 16, N. Y.

KNOW YOUR SYMBOLS

This symbol stands for fusible switch

®

This symbol stands for QUALITY

THE SAFETY SWITCH THAT CHALLENGES COMPARISON!

BullDog's general-duty safety switch—a star performer indoors and out!

All BullDog general-duty safety switches, in either indoor or raintight enclosures, combine these outstanding features for maximum safety and dependability:

- Minimum arcing—double-break switching
- Arc control—Vacu-Break® enclosed chamber
- Pressure contacts—Clampmatic® spring action
- Positive switching—direct handle operation

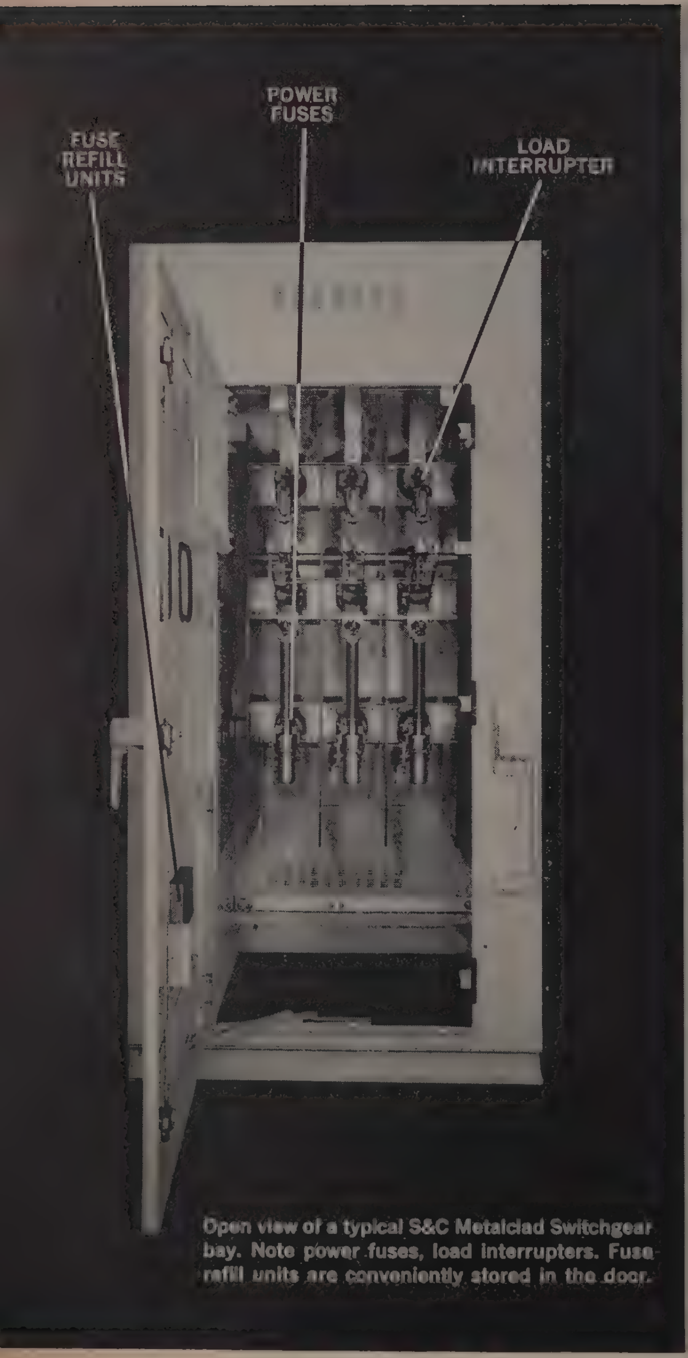
. . . Plus, all current-carrying parts are silvered. And with BullDog, you sell a complete line, competitively priced, that fills all over-the-counter calls for general-duty safety switches. The switches are available in both NEMA 1 and NEMA 3R enclosures. Challenge our field representative to prove these switches are the finest . . . or write BullDog for details.

BullDog Electric Products Division, I-T-E Circuit Breaker Company, Box 177, Detroit 32, Mich. In Canada: 80 Clayson Rd., Toronto, Ont. Export Division: 13 East 40th St., New York 16, N. Y.

I-T-E CIRCUIT BREAKER COMPANY

BULLDOG ELECTRIC PRODUCTS DIVISION

Reclosing is for the birds



Open view of a typical S&C Metalclad Switchgear bay. Note power fuses, load interrupters. Fuse refill units are conveniently stored in the door.

So why buy this feature in your 2.4 thru 14.4-kv switchgear?

Reclosing is for the birds, squirrels, tree limbs, lightning, icing, windstorms, and kite strings that frequently cause non-persistent faults on open distribution lines of utility systems. Reclosing re-energizes the lines to restore service in a fraction of a minute.

But when faults occur on the enclosed power supply circuits of industrial plants, commercial and institutional buildings, you don't want to reclose on them. These faults—while extremely rare—are permanent. Someone has to locate the trouble and repair the equipment or cable—or at least isolate it—before the system can be re-energized. So why buy expensive circuit breaker type switchgear with its automatic reclosing feature?

S&C Metalclad Switchgear—employing fused load interrupters—gives the ideal protection for enclosed power supply circuits. Power fuses furnish the fault protection (load interrupters switch the load). After a fault occurs, you simply replace the inexpensive fuse refill unit (typically costing $13.50) while the fault is being located and corrected.

The economics all say, "Reclosing is for the birds." Why pay for a function you can't use?

Cut your high-voltage switchgear costs in half by specifying S&C Metalclad Switchgear for your 2.4 thru 14.4-kv switching centers, service entrances, substation primaries and secondaries. Get full-load switching to 1200 amperes and fault interrupting to 500,000 kva.

See the Yellow Pages (Electrical Equipment) for your nearest S&C sales engineer. Or write to:

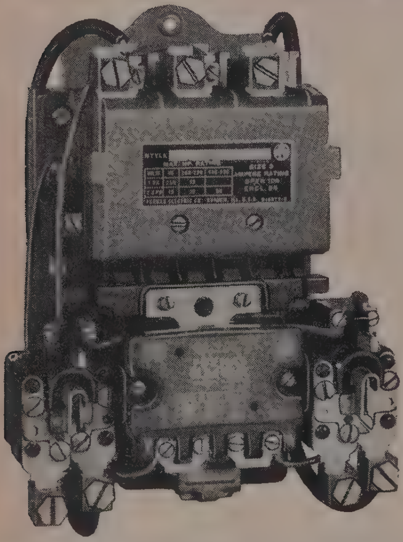
S&C Metalclad Switchgear meets all NEC requirements for fault-closing, short-circuit interruption. Performance proved by high-power testing at KEMA laboratories.

S&C ELECTRIC COMPANY
4433 Ravenswood Avenue • Chicago 40, Illinois
Specialists in High Voltage Circuit Interruption since 1911

The equipment is an S&C Metalclad Switchgear Assembly rated 13.8 kv, for a switching center.
The bird, a green-winged macaw, is an optional extra, obtainable at your local petshop.

NEW

SIZE 3



1/3 SMALLER

The new compact Furnas Size 3 magnetic starters, 1/3 smaller than other Size 3 models, incorporate inherently trip-free melting alloy type thermal relays for greater motor protection, and a simplified, low wattage, electromagnet design. For 2, 3 and 4 pole, 30-50 hp.

- Features 1/3 more wiring room than other models.
- Contact assemblies readily accessible for routine inspection or servicing.
- Front removable parts.
- Mounting dimensions on open type identical to Sizes 2 and 2½.
- Pilot light, pushbutton, selector switch and third overload can be added in the field.

Write today for Bulletin 14-B3, 1067 McKee Street, Batavia, Illinois

A110

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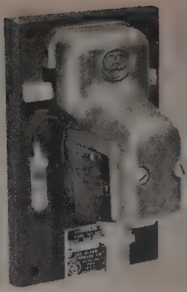
Sales Representatives in All Principal Cities

FURNAS



Limit Switch (12)

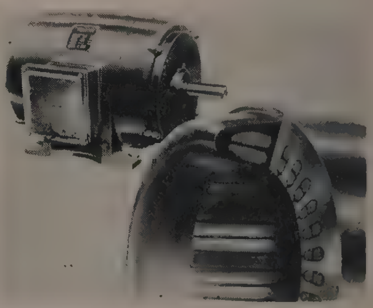
A new hoist limit switch protective relay, Bulletin 7328 Type XVR, can be used with either new or existing dc dynamic-lowering hoist controllers. Relay opens control circuit of a dynamic-lowering hoist controller in the event of certain unsafe conditions in the power-type hoist limit switch. Type XVR relay is recommended for use on hot-metal cranes, heavy cranes, duplex cranes, and any application where maximum safety is desired.

Clark Controller Company, 1146 East 152d St., Cleveland 10, Ohio

Switch (13)

An electronic mood lighting switch has been introduced. It is a combination wall switch and bright-or-dim control for incandescent lamps only that can turn the room lights "on" or "off"; and change the light intensity (level) in the room from bright to dim, or dim to bright. The switch and control unit fits and can be installed in a standard wall-switch outlet box without fear of creating a fire hazard. The bright-or-dim control is rated at 300 watts maximum on 120-volt ac electrical service.

Bryant Electric Company, Bridgeport, Conn.



Motors (14)

A new range of open, drip-proof motors has been introduced. Complete epoxy encapsulation of windings provides special protection for conditions where water, oil, chemical fumes or airborne abrasives may be present. Manufactured from ½ hp to 150 hp, these Newmanseal motors can be used in applications where high humidity, water, oil or chemical fumes are present. They also meet the requirements of weatherproof motors for outdoor service. Specifications are: NEMA open, drip-proof frames, ½ through 150 hp, 3-phase 60-cycle 208-220/440-volt, squirrel cage, 60°C rise with Class B insulation, Design B performance, continuously rated with standard NEMA service factors to NEMA standard MG1.

Newman Electric Motors, Inc., 357 *Wilson Ave., Newark, N. J.*

Relays and Contactors (15)

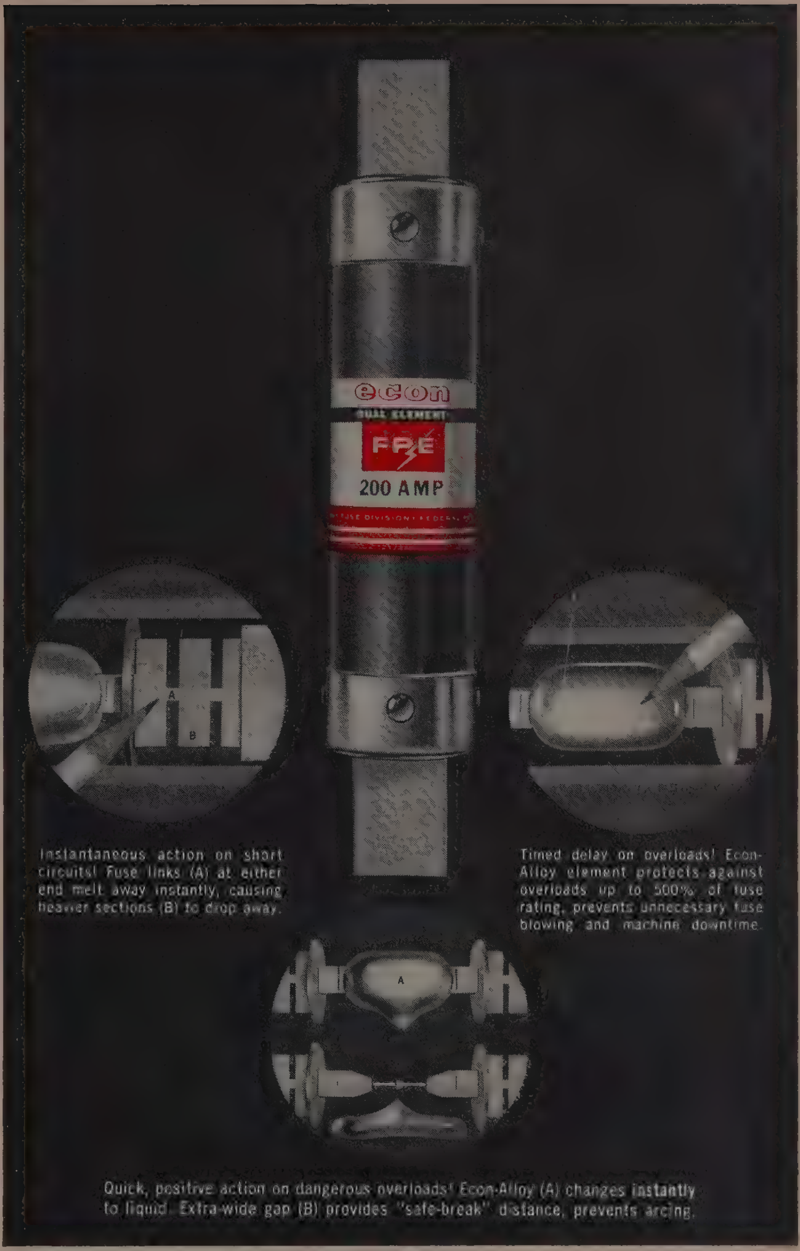
Four new 30-amp relays and contactors for non-inductive loads are now available. Ideally suited for use in electric heating and lighting, they feature quiet operation, wiping contacts, laminated frame operators and high-contact pressure. They are contact rated at 30 amps, 250 volts ac and may be applied continuously up to their full rating, open or enclosed, with conservative temperature rises. Publication No. 703 is available.

Automatic Switch Company, Florham Park, N. J.

Line Coupler (16)

A new line coupler which permits safe removal of circuit breaker and starter equipment has been added to the Spin Top enclosure for hazardous locations. Branch connectors are fully insulated for safety to personnel. Coupler mounts on a standard circuit breaker using stabs which are installed in the line terminals. Unit has a 50-amp rating, and is designed to withstand the same fault currents as the F frame circuit breaker.

Square D Company, 4041 *North Richards St., Milwaukee* 12, *Wis.*



Instantaneous action on short circuits! Fuse links (A) at either end melt away instantly, causing heavier sections (B) to drop away.

Timed delay on overloads! Econ-Alloy element protects against overloads up to 500% of fuse rating, prevents unnecessary fuse blowing and machine downtime.

Quick, positive action on dangerous overloads! Econ-Alloy (A) changes instantly to liquid. Extra-wide gap (B) provides "safe-break" distance, prevents arcing.

it blows!

(but only when it's supposed to)

On a short circuit, an Econ® dual-element fuse blows instantly. However, on an overload it blows only when the pre-determined heat and time limits are reached—never too early, never too late! This unparalleled consistency is possible because the Econ fuse has an exclusive eutectic thermal-alloy element acting as a heat-sensing device.

Econ's eutectic alloy, laboratory controlled from production to utilization, operates on the heat created by the over-current. Result—more dependable operation, lower fuse replacement costs and reduced downtime on machinery.

What's more, ECON dual-element fuses are certified by Electrical Testing Laboratories, Inc., to interrupt in excess of 100,000 RMS amperes! ECON dual element fuses are another big reason why, when it comes to fused circuit protection, it pays to "Remember to Use Economy Fuse!"

FPE **ECONOMY FUSE DIVISION,** Des Plaines, Illinois
FEDERAL PACIFIC ELECTRIC COMPANY

FREE! Complete 12-page fuse catalog and pocket-sized fuse selector for motor protection.

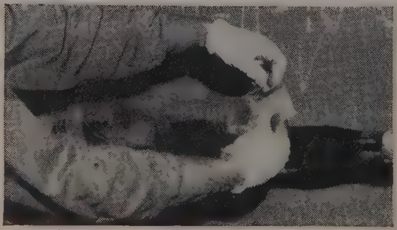
CUTTING POWER!

400 holes through 24-inch walls of concrete and heavy steel!

Longyear ®

To do a real tough job, a heavy construction firm with plenty of diamond drilling experience picked Longyear air-powered drills and 4-inch diamond bits. The rugged feed system and the powerful air motors helped finish the job on schedule. For more information on Longyear air driven and electric drills, write department 5C.

E. J. LONGYEAR CO.
76 S. Eighth Street, Minneapolis 2, Minnesota
Phone: FEderal 9-7631



G&W CABLE NIGHTCAPS

Seal Unfinished Cable Joints Against Moisture And Dirt

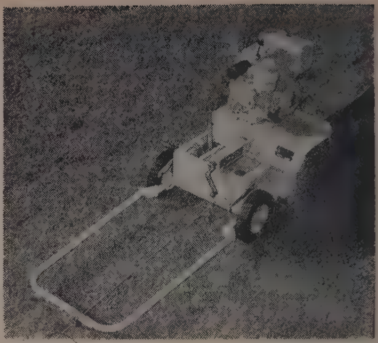
Cable splicing no longer need be one continuous operation when G&W Cable Nightcaps are used. Unfinished cable joints or terminations can be left overnight or for several days at a time with complete assurance that work will remain dry and clean as when sealed.

The G&W Cable Nightcap consists of a heavy plastic sleeve, waterproof paper to keep the plastic clean, tape, desiccant, and humidity indicator. The sleeve is slipped over the unfinished joint and one end taped tightly to the cable. Desiccant and humidity indicator are then inserted into the sleeve and its remaining end taped to the cable on other side of the joint. Waterproof paper is laid over the sleeve for protection.

Further information on the Cable Nightcap is available from G&W Electric Specialty Company or consult your local G&W representative.

G&W ELECTRIC SPECIALTY COMPANY
3514 WEST 127th STREET • BLUE ISLAND, ILLINOIS
CANADIAN MFR. • POWERLITE DEVICES, LTD.
TORONTO, MONTREAL & VANCOUVER

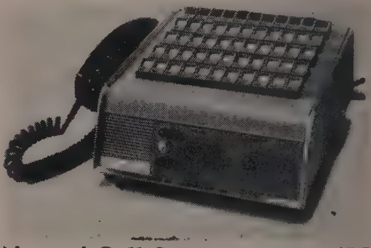
Superior quality standards—inspired specialized design J61-1



Trencher (17)

A new utility trencher, the Davis W-36, is powered by a heavy-duty 6-hp Briggs & Stratton engine and self-propelled by a six-speed winch drive. Unit trenches from 6 in. to 3 in. wide to a maximum depth of 36 in. deep, will operate at speeds up to 500 ft per hour. It has a built-in protective torque limiter that disengages when a shock load is encountered, then re-engages immediately to continue digging.

Davis Mfg. Inc., 1500 *South McLean Blvd., Wichita* 13, *Kansas.*



Nurses' Call System (18)

A flexible nurses' call system, called Answercall, is a new transistorized system which offers instant patient-staff communication high-speed connections that eliminate dialing and push-to-talk buttons, positive-call selection and patient privacy. When remote station units are installed, such as down the corridor or in utility rooms, calls can be answered without returning to central stations. Additionally, as each call is answered, the system resets itself, thus eliminating unnecessary bedside trips. By pressing a button, nurses can monitor patients' rooms without leaving their desks. The master station is complete with hand set for complete privacy of conversation and three-step volume control. Built-in speaker-microphones are also available. Answercall is available in flush wall and desk mounting models as well as in desk-top units, requiring a minimum of space.

Edwards Company, Inc., Norwalk, Conn.

Service Lights (19)

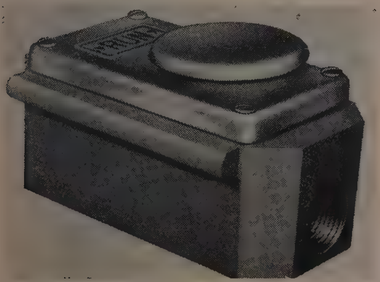
A new line of low-voltage and DeLuxe lampguards has been developed. The LV-Series low-voltage service lights are designed and built for protection against dangerous electrical shock under any working conditions. They are especially suited for use in damp areas and in service where grounding possibilities are ordinarily present. They operate from 110/120-volt line. A transformer steps down the voltage to six volts. Units are supplied with 6 ft of 3-wire cord on input side of transformer and 25 ft of 2-wire cord from output (6-volt) side of transformer to lamp guard itself. Units are completely enclosed in neoprene. The DeLuxe portable lampguard line features extra heavy construction for industrial service.

McGill Manufacturing Co., Inc., Valparaiso, Ind.

Boxes (20)

A new series of 12 plastic electrical boxes, named "Kralet," have been added to this line of rigid plastic (Polyvinyl chloride) conduit and fittings. Included in the new line are junction, FS, FSC, FSS and FD boxes with Types T, LB, C, LR, LL, E and X access fittings. Access boxes are supplied with covers, gaskets and stainless steel screws. All boxes are vapor and moisture proof.

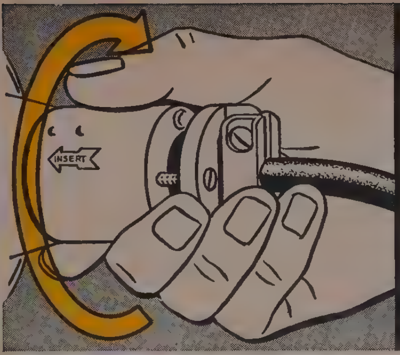
Kraloy-Chemtrol Co., 402 W. Central Ave., Santa Ana, Calif.



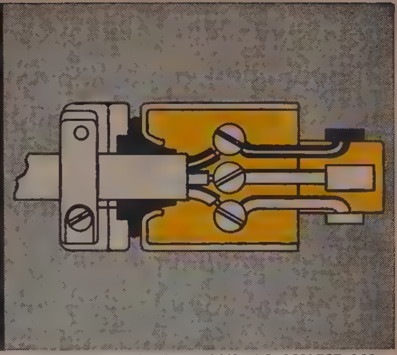
Pushbuttons (21)

A new "Finger-Grip" oiltight case for use with Type C—4A and 5A series—flush-mounted pushbuttons has been announced. Cast aluminum case has a half-inch finger grip on one edge to provide leverage for the operator. Finger grip is helpful in reducing operator fatigue when frequent, continuous operation is required. A one-inch tapered pipe tap is supplied in each end of the heavy duty enclosure.

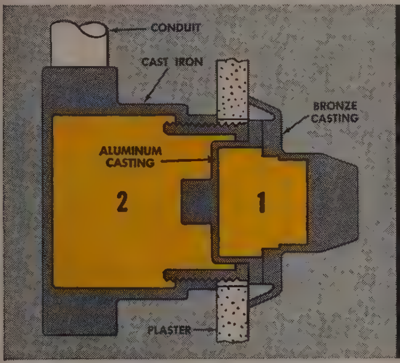
Clark Controller Company, 1146 East 152d St., Cleveland 10, Ohio



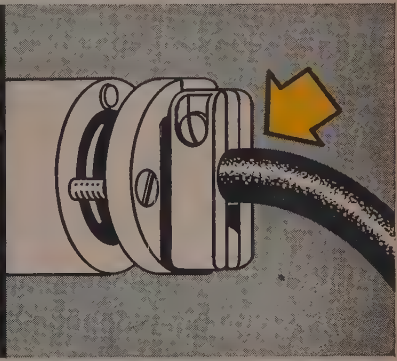
NO ARCING WHEN PLUGGING OR UNPLUGGING. Outlet is electrically "dead" until plug is inserted and rotated 22-25°. Reverse turn disconnects current before plug is removed. Spring pressure and keyed construction prevent accidental disconnection.



NO AIR SPACES INSIDE PLUG TO COLLECT GAS OR MOISTURE. After plug is wired to cord, electrician pours a self-hardening insulating resin into all air spaces. Interior of plug becomes solid, water-tight, vapor-tight mass.



TWO SAFETY CHAMBERS IN WALL OUTLET. Gas-tight chamber No. 1 (bronze and aluminum castings) contains and seals off switching mechanism. Cast iron chamber No. 2 keeps minor internal explosions from spreading to room.



CORD CANNOT PULL OUT OF PLUG. Double-clamping cord-grip relieves strain on plug terminals. And because terminals and wires are completely embedded in insulating resin, connections cannot loosen to cause arcing.

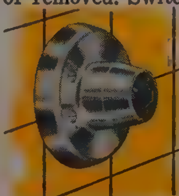
NEW

EXPLOSION-PROOF

RECEPTACLE AND PLUG

FOR CLASS I, GROUP C OR D, ATMOSPHERES

The Hubbellock Explosion-Proof Receptacle and Plug prevent arcing when electrical connections are made or broken in explosive atmospheres. No special wiring is required for installation in new or existing structures.



There are no air spaces in the plug where explosive gases can collect. No current can flow to the receptacle contacts while the plug is being inserted or removed. Switching takes place inside a vapor-sealed safety chamber of heavy bronze and aluminum castings.

Any 20-ampere, 125-volt, 60 cycle A.C. appliance may be operated from the receptacle by substituting the Hubbellock Explosion-Proof plug for the present plug. Appliances equipped with the Explosion-Proof plug will also operate in conventional 3-wire Hubbellock receptacles.

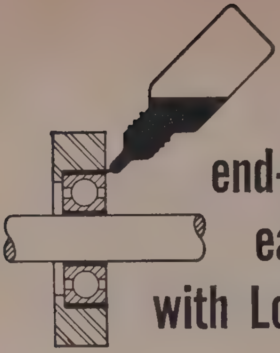
Plug and receptacle are listed by Underwriters' Laboratories and are described by the National Fire Protection Association for use in Class I, Group C or D, explosive atmospheres. They are ideal for hazardous industrial areas and for hospital operating and delivery rooms.

Write now for detailed specifications and prices.

"Hubbellock" is a registered trademark of Harvey Hubbell, Inc.

EXPLOSION PROOF **Hubbellock®** WIRING DEVICES

HARVEY HUBBELL, INCORPORATED • BRIDGEPORT 2, CONNECTICUT

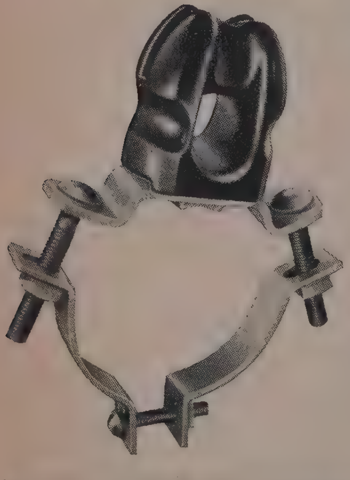


Loose-fitting end-bell bearings easily repaired with Loctite sealant

2¢ worth of Loctite Sealant, the plastic that acts as a "liquid shim," restores bearing fits in electric motor end-bells. Just a drop or two of Loctite on both bearing and housing does the job in minutes. Eliminates need for reboring, sleeves, shims, metallizing. Bearings mounted with Loctite can be removed with ordinary bearing removal tools. Comes ready to use. No mixing.

Call your distributor, or write us for literature and free sample

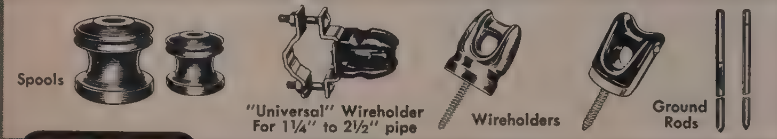
LOCTITE® SEALANT
AMERICAN SEALANTS COMPANY
349 NORTH MOUNTAIN ROAD • HARTFORD 11, CONN.



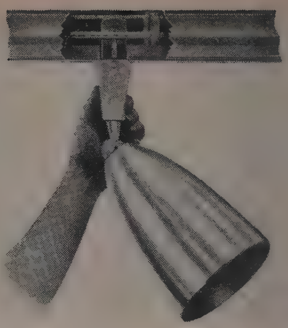
NEW OVERSIZE WIREHOLDER for large pipes

Utilities, industrial maintenance departments and electrical contractors will find many uses for this new oversize pipe mounting wireholder. It is quickly and easily installed on either 3″ or 4″ pipe. Massive insulator is copper bail reinforced for superior strength and corrosion resistance.

Porcelain Products Co. of Carey, Ohio, also makes other items ideal for utility use including a full range of wireholders, spools, ground rods, and some 120 other products. Write today for complete catalog.



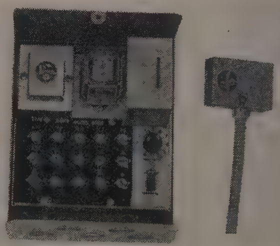
PP
PORCELAIN PRODUCTS CO.
225 N. Patterson St. • Carey, Ohio



Lighting Fixtures (22)

A new line of adjustable fixtures, called "Plug-A-Lites" are for use on GE LTG plug-in busway. For 150-watt R-40 or PAR-38 lamps, there is a choice of "Torpedo," "Catalina" or "Bermuda 38" shades. For 200-watt PAR-46 lamps, the "Bermuda 46" shade is available, and for up to 300-watt R-40 medium base lamps, the "Air-Cooled" shade or a non-shade version. They are available with A & N plugs for use on 2-pole or 3-pole LTG busways and with B & N plugs for 3-pole busways only. Either plug can be inserted along the entire busway length, which can be recessed in hung-type ceilings. The units adjust to any desired position. Bulletin No. 145 is available.

Swivelier Company, Inc., 30 Irving Place, New York 3, N. Y.



Control and Scanner (23)

A new high-speed photoelectric impulse control and scanner have been announced. Control, Type 23DF3, is a fully transistorized unit designed to operate on any small, abrupt change in the light reaching the photoconductive cell. It is especially suited for detecting register marks in high-speed registration control applications. A scanner, combination of light source and photoelectric receiver, has been designed for use with the 23DF3 as a registration control. A switch permits operation to be set for either light increase or decrease. An internal time-delay circuit may be used to automatically reset the control or if desired, resetting can be performed by an external switch. Operation of relay can be prevented by opening external reset switch.

Photoswitch Division of Electronics Corporation of America, Cambridge, Mass.

Plug and Receptacle (24)

A new heavy-duty explosion-proof plug and receptacle for high-power applications in hazardous areas has been announced. Developed originally for servicing US Naval aircraft, the unit will handle loads up to 200 amps, 480 volts ac and is UL listed for all Class I, Group D locations. The flush-mounting unit, called Type EAR-EAP, has a watertight cover and is designed to withstand heavy wheel loadings. It is particularly suitable for use in welding areas at oil refineries, for large motor disconnect applications or wherever a high-power plug and receptacle is needed in a hazardous area. They are available in 60-, 100- and 200-amp ratings at voltages up to 480. Pressure contacts are provided in a selection of 2-wire, 3-pole; 3-wire, 4-pole; and 4-wire, 5-pole units.

Crouse-Hinds Company, Syracuse 1, N. Y.

Time Switch (25)

A new line of two-circuit time switches is designed to permit the switching of two load circuits at different times with one control. Known as the Intermatic "Two-Trol" Series V25000, it is available in 120- or 240-volt, at 30 amps per pole. They will control two separate circuits independently or simultaneously by setting the trippers for the desired schedule of operation. Other features include: E-Z See Dial, manual control with automatic reset, solid brass terminals, snap action silver contacts and liftout mechanism. Bulletin NR-101 is available.

International Register Company, 2624 W. Washington Blvd., Chicago 12, Ill.

40% MORE CUTTING POWER

CHANNELLOCK® WIREMASTER

with 2 exclusive improvements

Special enclosed joint assures perfectly matched cutters ALWAYS. Jaws cannot become misaligned EVER.

40% more cutting power because the joint rivet is . . .

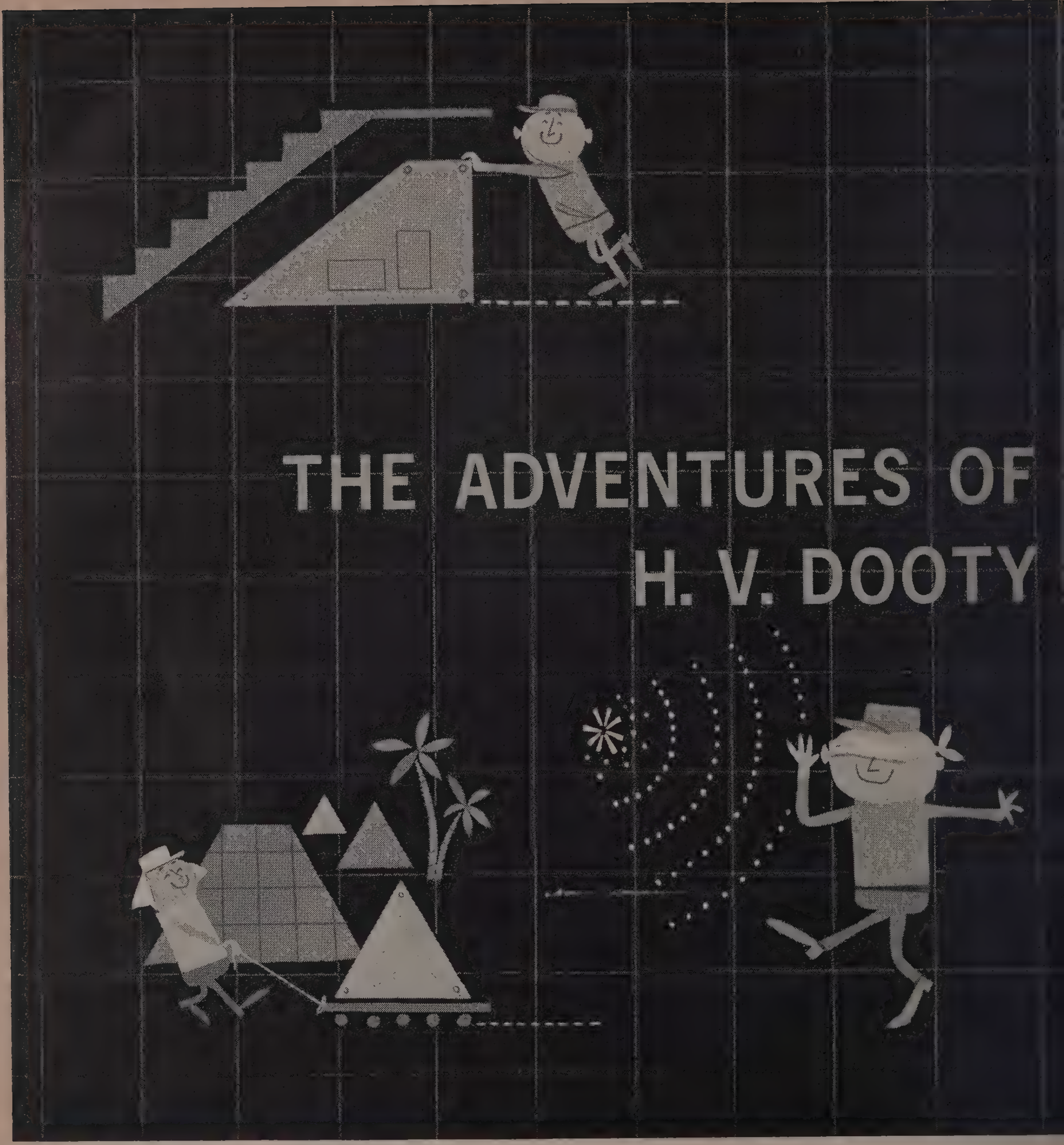
HERE NOT HERE

the result is this

instead of this

Be sure it's genuine Channellock. Look for the trademark on the handle. Write for catalog showing complete line of pliers.

CHAMPION DEARMENT TOOL COMPANY • MEADVILLE, PA.



CUSTOM-ENGINEERED TRANSFORMERS TO FIT YOUR APPLICATION NEED. You may never want or need dry-type or oil filled transformers for the top of a pyramid or any other of the applications cartooned above. But consider this. We *are genuinely interested* in your special transformer problems. We specialize in "specials"

We welcome your special mechanical requirements, your special electrical characteristics. The unusual, the unique for other transformer manufacturers often are virtually standard requests for our specials shop. There's a reason. We're *set up* for "specials" production. We're set up to build fast, build right!

Examples: Need a special low-sound level? We've built 'em oversize to achieve required decibel ratings. Need unusual physical dimensions? We've produced a 28-inch-high transformer, rated 500 kva, for a mine application. Or do you want low temperature rise for high ambients? Fungus

proofing for special environments? And we'll supply primary pothead, lightning arrester, secondary circuit breaker, air-break primary — you name it.

A special note. For your protection, our ratings are heat-run tested on every transformer built. If anything, our ratings are ultra-conservative.

For special long-life, dry-type or oil filled transformers — single and three-phase up to 3000 kva — call or write *the special transformer specialist — Hevi-Duty!*

HEVI-DUTY

A DIVISION OF
BASIC PRODUCTS
CORPORATION

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HEVI-DUTY ELECTRIC COMPANY
MILWAUKEE 1, WISCONSIN

H-45-61

INSTALLATION AS FAST
AS WITH REGULAR FLEXIBLE CONDUIT

PROTECTION AS SURE
AS RIGID CONDUIT

LIQUATITE®

EXTRUDED POLYVINYL JACKET MOLDED TO GALVANIZED FLEXIBLE CONDUIT

Complete protection against any and all contamination–impervious to water, oils, chemicals, corrosive atmospheres. Installed in minutes. No more "downtime" due to wiring shorts or burnouts, no more periodic wiring replacements.

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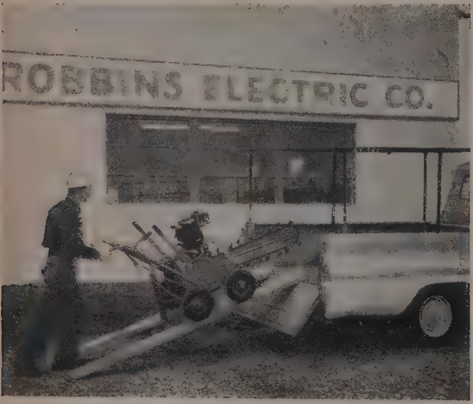
Write for free sample, costs and name of Distributor nearest you.

ELECTRI-FLEX COMPANY
P. O. BOX 128-C • ROSELLE, ILLINOIS

POW-R-SPADE
PORTABLE TRENCHER



ELECTRICAL CONTRACTORS USE POW-R-SPADE to lay cable and conduit. Savings and extra profits on every job. Have your own machine. No waiting. No delays.

"A labor saver, easy to operate, and profitable"

Fast trenching at lowest cost. Reduces man-hours to minutes. Eliminates disadvantages of subcontracting. A profitable, inexpensive machine to own and operate.

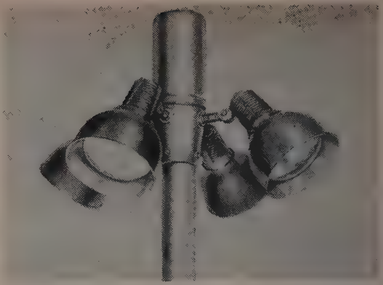
- Digs 3 in. wide by 1 to 24 in. deep; or 4 in. wide by 18 in. deep
- Light weight, compact, portable
- Since 1956 satisfied users all over U. S. A.
- Dependable trouble-free trenching at lowest cost.
- Digs 1½ to 17 ft. per minute, depending on soil conditions

Digs straight, curves, or angles without special set-up. Comes completely assembled. One man operation from start to finish.

FOR FREE BOOK ON POW-R-SPADE AND PRICES CALL COLLECT 788-9527

OR TEAR OUT THIS AD — ATTACH TO LETTERHEAD AND MAIL DIRECT

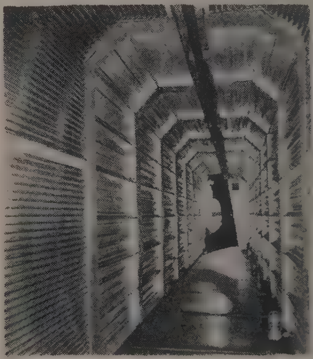
POW-R-SPADE
STAMPINGS, INC.
Dept. E, Rock Island, Illinois



Floodlights (26)

A new line of sealed-beam mercury vapor floodlights for wide-area lighting feature two compact high-wattage transformers. These 4-lamp 400-watt and 2-lamp 1000-watt constant-wattage transformers allow more fixtures per pole, with fewer poles per installation. Floodlights are die-cast aluminum with spun aluminum hoods ventilated for cooler operation of 400-watt R-52, R-57 and R-60 or 1000-watt R-80 color-improved mercury vapor lamps. The complete weatherproof line includes one, two and 4-light mercury clusters for pole-top, mid-pole or wall mounting, as well as assemblies for up to 1500-watt incandescent lamps.

Stonco Electric Products Company, 333 Monroe Ave., Kenilworth, N. J.



Heating Panels, Ovens (27)

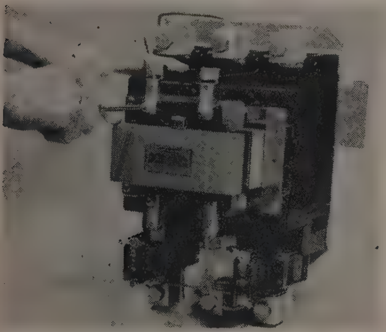
A new line of electric quartz infrared heating panels, elements and oven assemblies for application in process heating. Infrared elements are available in 22-, 46-, and 70-in. over-all lengths with wattage ratings from 500 to 1500 watts for 115-volt elements and 500 to 3500 watts for 230-volt elements. Heater panels are supplied for both front and back wire connections. Panels are made to accommodate one, two and four elements and are made in 2-, 4- and 6-ft lengths. Bulletin 62460 is available.

Fannon Products Div., Hupp Corp., 3000 *E. Woodbridge, Detroit* 7, *Mich.*

L-V Control System (28)

Low-voltage control system for electric heat, called "Level-Temp," has been announced. System has two components; a highly sensitive Level-Temp thermostat provides narrow differential control through a Level-Temp silent operator which handles the line voltage heating load dependably and silently. It is ideal for controlling such installations as in-duct heaters, wall insert heaters, blast-coil heaters, baseboards, floor register heaters, unit ventilators, auxiliary heaters of heat pumps, etc. It is UL listed, features 18 in. color-coded leads, and has a 5000-watt 240-volt, noninductive rating. Two or more may be controlled from a single thermostat to "sequence on" several heating loads. Folder R-1741 is available.

White-Rodgers Company, 9797 Reavis Road, St. Louis 23, Mo.



Motor Controls (29)

New NEMA Size 5 contactors and starters have been added to the G-E family of 100-line motor controls. Dimensions of the new open starter are 14¼ in. high, 11¾ in. wide and 9 in. deep. Enclosed forms are 31⅛ in. high, 15¾ in. wide and 10½ in. deep. The enclosed forms have a total of ten combination knockouts—three at top and bottom and two on each side. Enclosure also has keyhole slots for mounting. All connections on Size 5 are made from front. Solderless pressure-type terminals speed hook-up time. Terminals on the Size 5 will take up to 500 MCM cable. The new form utilizes a horizontal straight line magnet action. Overload relays on starter are adjustable plus or minus 15% of nominal heater rating by turning a knob. Knockouts are supplied in the enclosure covers for adding an indicating light, pushbutton or selector switch. Size 5 is rated up to 200 hp, 600 volts.

General Electric Company, Schenectady 5, N. Y.

To save time . . .
Every Tool Box Needs
a compact, easy-to-carry
RIDGID®
Drop Head Threader Set

Snap a die head in the ratchet ring . . . cut your thread! It's as simple as that with a RIDGID drop head threader. Heads can't fall out . . . dies reverse quickly for close-to-wall threading. Finest quality RIDGID long wearing dies. Straight thread dies available.

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Hand Carrier Free With All Sets Except No. 12-R
(Order in sets or any combination)

Exposed Ratchet Type
For pipe: ⅛" to 1"—00-R; ⅛" to 1¼"—111-R; ⅛" to 2"—12-R
For bolts: ¼" to 1"—00-RB

Enclosed Ratchet Type
For pipe: ⅛" to 1"—0-R; ⅛" to 1¼"—11-R

RIDGID®
The Ridge Tool Company, Elyria, Ohio, U.S.A.

You can feel its new FLEXIBILITY...see the new SUPPLENESS!
BRONCO
66 CERTIFIED
PORTABLE ELECTRICAL CORDS & CABLES

BRONCO 66 Certified, because it is Synchro-Cured, has long been famed as the most flexible cord and cable on the market. Now, a new treatment lubricates the insulation on the single conductors. When the cable is flexed, the singles slide against each other with less friction than ever before. The resilience provided by the great quantity of Neoprene—67.3%—in the jacket, the exclusive BRONCO Synchro-Cure process of vulcanization, and lubricated singles all work together to give you the most flexible, easiest stripping, longest-lasting, most completely satisfactory portable cords and cables ever made. Write for a free sample of the new BRONCO 66 Certified so that you may feel and see this new flexibility for yourself.

SOLD NATIONALLY BY ELECTRICAL WHOLESALE DISTRIBUTORS

WESTERN INSULATED WIRE CO.
LOS ANGELES 58, CALIFORNIA

Disconnecting Switch (30)

A new low-voltage high-current disconnecting switch (Type DBDS) handles 1000-volt, 10,000-amp dc or 600-volt, 8000-amp ac. Steel-panel-mounted switch uses components from DB circuit breaker line to eliminate arc chute and arcing contacts of circuit breaker assembly. Switch is closed by a rotary handle motion and opened by a trip button. Switch position indication is provided in operating mechanism, and auxiliary switches may be provided if desired.

Westinghouse Electric Corp., P. O. Box 2099, *Pittsburgh* 30, *Pa.*

Platform (31)

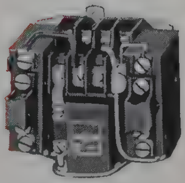
A portable platform, called Uni-Stage, is for all types of maintenance and repair work. It consists of three basic components: a steel and plywood stage; ladder panels; and casters. Unit weighs 186 lbs. It is suitable for general plant maintenance since it straddles 6-ft high machinery or obstructions. Capacity of basic stage is 800 lbs. The stage is available in either 7- or 10-ft lengths and in a standard width of 24 in.

Universal Manufacturing Corp., Zelienople, Pa.

They OUTPERFORM and OUTLAST ALL Others

These new Allen-Bradley starters bring you the greatest advance in reliability and life in all motor control history. Also, they possess a compactness that's almost unbelievable—especially in the higher ratings.

The new Bulletin 709 solenoid starters feature a patented, high-efficiency magnet, which is cushioned to reduce shock and wear. Contacts are of weld-resistant cadmium oxide silver. All coils are "pressure molded" for protection against physical damage and destructive atmospheres. The two or three solderpot overload relays are trip-free and tamperproof. Brooks Stevens, famous industrial designer, has given the new enclosures a styling that adds "eye appeal" to every installation. To get full details, contained in Publication 6100, please write today to: Allen-Bradley Co., 1316 S. Second Street, Milwaukee 4, Wisconsin.



SIZE 00 NOW AVAILABLE

Provides the same long life and reliability as others in the Bulletin 709 family. Rated 1½ HP, 220 V; 2 HP, 440-550 V.

15-61-MR

ALLEN-BRADLEY

Member of NEMA

QUALITY MOTOR CONTROL

Here Your Motor Starter Dollar Buys

MORE OF THE QUALITIES YOU NEED

BULLETIN 709 SIZE 3
across-the-line solenoid starter in Nema Type 1 enclosure.

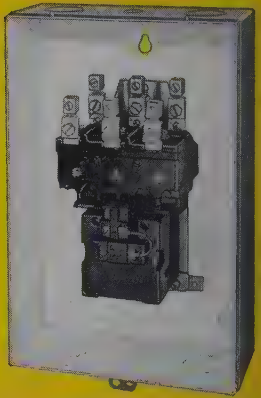
Where else could you possibly obtain—in one complete line—all of the desirable features of the ideal motor control...

1. **Smaller size**
2. **Greater reliability**
3. **Remarkable switching capacity**
4. **Longer life**
5. **Conscientious overload protection**
6. **Simpler installation**
7. **Complete accessibility**
8. **Beautiful appearance—either open or enclosed**
9. **Surprising light weight**

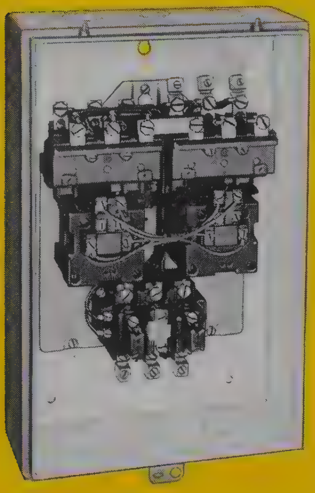
The heart of this new line of magnetic motor starters is the unique solenoid contactor. While it retains the famous A-B one-moving-part principle, it is completely new and far more efficient. This fact is reflected in reduced dimensions for all of these controls. Yet, this contactor design will perform reliably for many more *millions* of trouble free operations.

The new enclosures are very "eye appealing." When the open type starters are assembled into special panels, their neatness and compactness will delight the designers. Full details are in Publication 6100. Please write: Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.

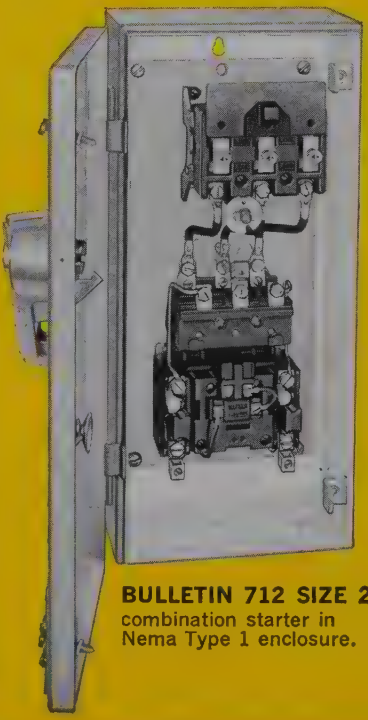
A-B
QUALITY



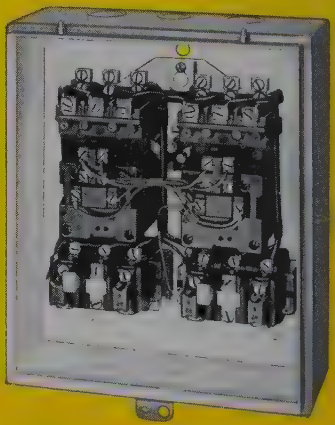
BULLETIN 702 SIZE 3
three-pole, a-c solenoid contactor in Nema Type 1 enclosure.



BULLETIN 705 SIZE 2
across-the-line reversing starter and overload relays in Nema Type 1 enclosure.



BULLETIN 712 SIZE 2
combination starter in Nema Type 1 enclosure.



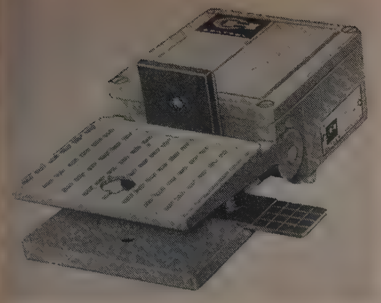
BULLETIN 715 SIZE 1
across-the-line, two-speed starter—with two overload relays per speed—in Nema Type 1 enclosure.

15-61-MR

ALLEN-BRADLEY

Member of NEMA

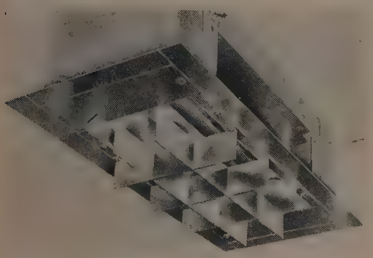
QUALITY MOTOR CONTROL



Foot Switch (32)

A Type B, heavy-duty, treadle operated foot switch has been added to the Bulletin 10251 line. Foot switch is available with one or two precision unit switches, each with one normally open—one normally closed contact arrangement. Also available is a treadle latch for on-the-job conversion from spring return to maintained contacts. Heavy-duty enclosures are NEMA 4 watertight and oiltight, with an oil- and water-resistant gasket between cover and enclosure, and "O" ring seal on the treadle operating shaft. Switches are also available with NEMA 7 and 9 enclosures for operation in hazardous locations.

Cutler-Hammer, 315 North 12th St., Milwaukee 1, Wis.



Electric Heater (33)

A new Chromalox electric infrared comfort heater for installation in marquees of hotels, stores, theatres, terminals and other public buildings. It is designed for recess-mounting and has a golden anodized aluminum reflector, frame and louvers. A choice of three electric heating element types are available —metal sheath, quartz tube and quartz lamp. Heaters are offered in sizes from 11 in. in length to 43 in., and 600 watts to 5250 watts capacity. Chromalox input controllers and contactors or manual circuit switches are optional for controlling operation of heaters. Bulletin F74100 is available.

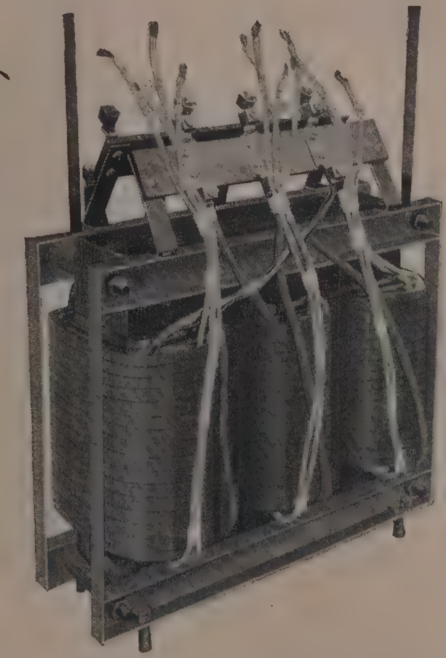
Edwin L. Wiegand Company, 7500 Thomas Blvd., Pittsburgh 8, Pa.

DONGAN

QUIET *DRY TYPE*

TRANSFORMERS

Dongan has specialized in the manufacture of dry type transformers for more than 50-years. This length of service to the electrical industry assures you of high quality, dependable transformers. Carefully built to your requirements, they will give long, quiet service.



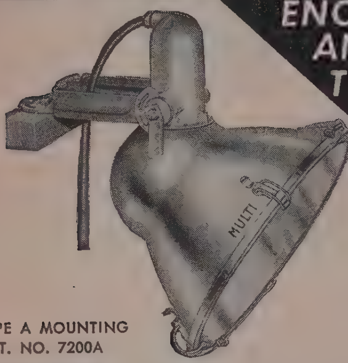
DONGAN DRY-TYPE TRANSFORMERS are made in both class B 80° Cent. Rise and Class H 150° Cent. Rise. Single phase transformers, 25 V.A. to 100 KVA; three phase, 3 KVA to 300 KVA. Suitable for indoor or outdoor applications. Designed for wall or platform mounting. All have roomy wiring compartments.

Sizes 5 KVA and larger feature tap-changing and voltage-changing terminal board equipped with solderless connectors for speed hook-up. Built to meet or exceed NEMA specifications.

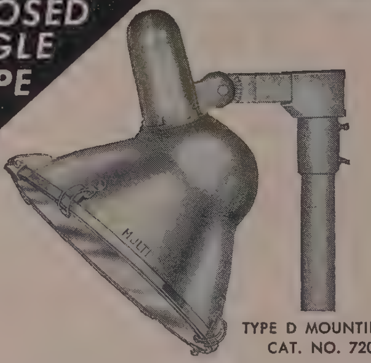
Dongan also makes transformers for-signaling-machine tools-control-buck and boost-high voltage secondary for oil and gas burners-neon signs.

DONGAN ELECTRIC MFG. COMPANY
2980 Franklin Street **Detroit 7, Michigan**
***Telephone:* LO 7-3974**

Multi gives you all that's new in
ALZAK ALUMINUM FLOODLIGHTS
ENCLOSED ANGLE TYPE

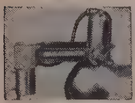


TYPE A MOUNTING
CAT. NO. 7200A



TYPE D MOUNTING
CAT. NO. 7200D

TYPE B



TYPE C

TYPE E

VARIETY OF MOUNTINGS CUT INSTALLATION TIME

Semi or fully enclosed type for 500-1500 watt incandescent or 400 watt Mercury Vapor Lamps. These Multi floods are quality produced to assure maximum light output. Reflector is spun aluminum Alzak finish. The heat and impact resistant lens and cable entrance are water-tight. Lens is hinged and secured by stainless steel spring clamps. All mountings malleable iron plated. Rotation stop, protractor and locking lever. Write for literature on complete Multi-Nepo line of floods, luminaries, poles, fittings, mountings, etc.

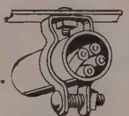
MULTI ELECTRIC MFG. INC.
4223 W. LAKE ST. CHICAGO 24

COMPARE*
Blackhawk's HOLDING AND FASTENING FITTINGS

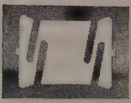
1.

2.

3.



4.



5.

1. SNAP-STRAP RIGID CONDUIT — 700. The original snap on clamp that snaps tighter and holds its grip. Sizes: ⅜" to 2"

2. SNAP-STRAP FOR THINWALL CONDUIT — 1700. Same style as 700 line, except they are made to fit Thinwall conduit. Sizes: ½" to 2"

3. BEAM CLAMP. Complete with case hardened set screw. Fits up to ½" thick beam flange. ¼-20 tapped holes.

4. CONDUIT HANGER. Designed to hold thinwall and rigid conduit. ¼" hole in the base permits use with toggle bolt, wood screw or anchor. Complete line of sizes.

5. 540 ONE PIECE BOX SUPPORT. Provides rigid, unified support. Easy to install. The first and finest.

Only a few of Blackhawk's famous holding devices that save you time . . . build a reputation for quality service.

Judge Blackhawk's quality for yourself

COMPARE
Send this coupon today for your free sample of Blackhawk's holding and fastening fittings
Blackhawk Industries Box 708 Dubuque, Iowa Dept. ECM-121
Name
Address
City State
Blackhawk Industries *where the new ideas come from*
DUBUQUE, IOWA

Dimming System (34)

A silicon electronic fluorescent dimming system and a silicon electronic incandescent dimmer control have been introduced. The silicon controlled rectifier (SCR) incandescent dimmer controls—both 500 and 800 watts—are compact enough to fit inside a standard light switch-box of old or new construction. A toggle switch allows current to be turned on or off with dimmer dial in any position. The fluorescent dimming system consists of a wall control that also mounts in a standard switchbox and has a separate on-off switch. System contains a master dimming strip fixture which can actuate a complete circuit of one to eight auxiliary dimming strips.

Thomas Industries Inc., 207 *East Broadway, Louisville* 2, *Ky.*

Capacitor Banks (35)

Improved metal-enclosed capacitor banks, Mod-ul-var-50, containing oil switch and current-limiting fuses have been announced. Units use a 1500-kvar compartment. A 6000-kvar bank contains four 1500-kvar compartments and ratings such as 3000 and 4500 kvars are now standard for industrial and utility applications. Current-limiting fuse on each capacitor has a condenser at one end to reduce gases expelled when fuse operates. Fuses give visual indication when operated. Units are available with a full range of air or oil circuit breakers for switching and bus fault protection. A new oil switch, type CS-40, rated 40,000 amps momentary is also available.

Westinghouse Electric Corp., P. O. Box 2099, *Pittsburgh* 30, *Pa.*

Blower (36)

A new hand-operated blower is designed for ventilating fallout shelters. Blower is a rustproof aluminum casting and hand-cranking mechanism; is trouble and maintenance-free. Cranking at a rate of 80 turns per minute will produce approximately 185 cu ft of air per minute. Blower has 4-in. diameter connections which may be reduced to 3 in., although drawing the same amount of air through the smaller pipe involves more effort. For periods when house current or battery power is available, blower can be equipped with an auxiliary power blower to eliminate hand cranking. Made in either 115 ac or 6 to 12 dc volt models, the auxiliary blower produces 125 cu ft of air per minute. Model VM-8 is approximately 11½ in. square and 6½ in. deep. It is provided with a mounting clamp suitable for table or bench top but can be mounted anywhere in any desired position.

Cincinnati Fan & Ventilator Co., 3524 Wiehe Road, Cincinnati 37, Ohio

Tester (37)

A new service entrance testing device, called "Test-M-Lite," is designed for use up to 240 volts. The pushbutton instrument will determine, before connecting a customer's service, whether there is an unintentional load or only a meter potential coil load. Two test sets can be used in series on circuits above 240 volts, up to 480 volts. These sets are used to identify conductors of 120-volt, 2- or 3-wire, single-phase, 120/208 or 120/240-volt, 3-phase, 4-wire and 277/480 volts, 3-phase 4-wire secondaries.

HD Electric Company, Deerfield. Ill.

Plastic Fishtape (38)

A new plastic fishtape combines absolute non-conductivity with the strength and stiffness of conventional steel tapes. It can be operated in below-street vaults without hazards. The plastic fishtape is produced from a Cadco plastic copolymer. Fishtapes are produced in continuous lengths of 200 ft and longer. Available initially in ½ in. diameters.

Cadillac Plastic & Chemical Co., 15111 Second Ave., Detroit 3, Mich.

Exit Sign (39)

An exit sign which uses a Rayescent panel is now available. The sign, treated with red dyes for a red glow, can be mounted flush with a wall or suspended from a ceiling to identify exits. Available in a 6- by 12-in. size with 5-in. letters, sign consists of a metal frame, simple wiring, and Rayescent panel. Ceiling units come equipped with a 5-in. diameter by 1-in. deep aluminum canopy. Unit operates on 120 volts, ac and incorporates a transformer for changing voltage to 240 volts for the Rayescent panel. Panel draws 1 watt for the first few hundred hours, after which power consumption may drop to as low as 0.65 watt.

Westinghouse Lamp Division, MacArthur Ave., Bloomfield, N. J.

Wagner® Replacement Bearings DO help you make faster, better motor repairs.

WAGNER® SLEEVE BEARINGS fit right every time because they are exact duplicates of the original bearings used in Wagner motors. Steel-backed and 85% tin babbitt-lined, they are precision bored to size . . . won't seize or grab, won't corrode.

WAGNER® BALL BEARINGS are exactly right for the motor in which they're used. They are the same high quality bearings used in new Wagner motors . . . the finest money can buy.

SLEEVE BEARING REPLACEMENT IS EASY WITH THE WAGNER® BEARING TOOL

This time-saver lets you drive out the worn bearing and install a new Wagner sleeve bearing in a single, easy operation. No pounding or reaming is necessary . . . you get perfect alignment every time.

P. S. ***If the motor isn't worth repairing, sell a new Wagner® motor.*** There are times when it just doesn't pay to repair an old motor. That's the time to replace worn-out motors with new Wagner motors. You remove any doubt about making a profit on repairing a badly worn motor, and save time for other repair work. Best of all, you make full profit on every Wagner motor sale, plus giving your customers over-the-counter service. See your Wagner distributor . . . learn how easy it is to cash in on motor replacement sales.

Wagner Electric Corporation

6413 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U. S. A.

OVER 850 AUTHORIZED SERVICE STATIONS OR PARTS DISTRIBUTORS WR61-4

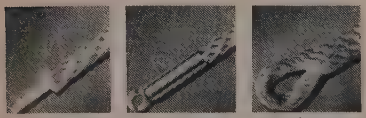
MOTORS • BEARINGS • STANDARD ROTORS • BRUSHES • CAPACITORS • COMMUTATORS

For "fishing" conduit

NOW—with RIGID ROPE—fish any 1/2", 3/4", 1" conduit faster, safer, for less cost!

- **Greater rigidity**—tightly braided jacket over improved core. Non-conductor!
- **Strong**—withstands one or two man pull.
- **Affords excellent grip**—never cuts even when wrapped around hand.
- **Lightweight**—14 oz. per 50 ft. Available in 50' and 100' lengths.

RIGID ROPE costs less than any metal tape designed for use in all types of conduit. (Polyethylene "Guide Sleeve" for outlet boxes included.) *Patent Pending


New improved core New metal eye Non-conductive loop
Connect wire at either end!

For full information on RIGID ROPE, and the complete Jet Line Method of wiring conduits, ask your distributor or write

JET LINE® PRODUCTS, INC.
305 Foster Ave.
Charlotte 3, N. C.
5916

Catalogs & Bulletins

(40) ARCHITECTURAL LIGHTING Catalog S-62 illustrates a variety of weatherproof cast aluminum fixtures, floodlights, and luminaires designed specifically for decorative architectural installations. Stonco Electric Products Co.

(41) TERMINAL BOXES. Bulletin MA3 describes new fractional hp motor terminal boxes which are made in two types: Catalog G-502 has a 2 in. radius; and G-503 has a 3 in. radius. Kolton Electric Mfg. Co.

(42) SWITCHES. ALTO-SAVAR Bulletin 1130B describes new vertical configuration space-saving, line tap-off and sectionalizing switches. Greensburg Div., I-T-E Circuit Breaker Co.

(43) ELECTRICAL TAPE catalog describes entire Slipknot and Plymouth line. Tape Div., Plymouth Rubber Co., Inc.

(44) LIGHTING. 16-page Bulletin GET-3100 describes basic functions of luminaires, both street lighting and floodlighting types, with photometric data and sample problems for roadway lighting and area lighting applications. General Electric Co.

(45) 2-BOLT CONNECTORS and cross tap clamps for heavy duty copper connections are described in Bulletin 6108. Jasper Blackburn Corp.

(46) CALCULATING. 64-page mathematical handbook contains powers and roots, logarithms, decimal equivalents, circular arc tables, mensuration formula, weights and measures, conversion factors, etc. Curta Co.

(47) TRANSFORMER. Bulletin 61202 covers information on the self-regulating transformer and explains the connection versatility and location flexibility. Line Material Industries.

(48) SEAWATER BATTERY, called the Seacel, is described in technical data sheet. Yardney Electric Corp.

(49) DISC BRAKE bulletin covers new line of "auto-adjust" brakes which mechanically and automatically re-adjust themselves. Stearns Electric Corp.

GET BETTER COMMUTATION THROUGH ELIMINATION OF DAMAGING VIBRATION

LONGER BRUSH LIFE, TOO

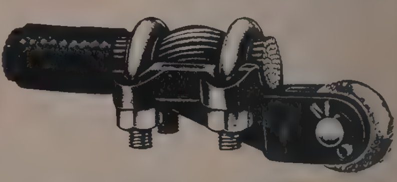
HELWIG RED TOP BRUSHES . . .

- absorb vibration, eliminate arcing
- wear evenly for longer life
- commutate under all load conditions
- reduce commutator maintenance

HELWIG CARBON PRODUCTS, INC.
2544 North 30th Street, Milwaukee 10, Wisconsin

"EFFICIENCY" Cable Strain Clamp

WITHOUT DAMAGE TO CABLE



. . . WITHSTANDS DIRECT PULL OF 17,000 POUNDS

Efficiency Cable Strain Clamps lock cable safely and securely without possible strain or damage. "H" construction of clamps and high ridge across center of cable prevents cable from slipping. Takes cable from 1/0 to 1,500,000 c.m. Three clamp sizes cover all cable sizes. Furnished with eye or clevis, for AC or DC service.

EFFICIENCY
ELECTRIC & MFG. CO.
EAST PALESTINE, OHIO

(50) LIGHTING FIXTURES. Wall or ceiling mounting cast aluminum lighting fixtures designed for outdoor use are illustrated and described in Folio CA-61. Gruber Brothers, Inc.

(51) LIGHTING. A new series of four bulletins describes outdoor lighting transformers and their applications. Jefferson Electric Co.

(52) POWER SYSTEMS. Bulletin No. 83, "Feedrail Motor Driven Electric Power Systems," describes electric power outlets whose movement can be synchronized with the movement of a conveyor for mass production assembly and electrical testing. Feedrail Corp.

(53) SNAP-ACTION SWITCHES. 20-page catalog lists and describes the full line of basic snap-action switches for use in electrical, electronic and electro-mechanical applications. Cherry Electrical Products Corp.

(54) UNDERFLOOR DUCT SYSTEMS. 64-page Catalog No. 761 presents information and drawings on Walkerduct, various types of junction boxes and parts for use with Walker No. 2 duct or a combination of No. 2 and large capacity No. 4 duct. Walker Brothers.

(55) BASEBOARD HEATING. 4-page Brochure R16101 illustrates Chromalox electric baseboard heating. Edwin L. Wiegand Co.

(56) ELECTRIC CONVECTION HEATERS for surface or recessed mounting on wall in capacities from 1 to 4 kw are described in Bulletin EC-286. Electromode Div., Commercial Controls Corp.

(57) SPEED REDUCER. A small shaft-mounted speed reducer, latest addition to the Torque-Arm line, is described in 4-page Bulletin 602A. Dodge Manufacturing Corp.

(58) TRANSFORMERS. Bulletin GEA-6790A, describes all-new gas-filled sealed dry-type transformers. General Electric Co.

(59) ELECTRIC FURNACES rated 10, 15 and 20 kw for installation in basements, attics, closets or crawl spaces are described in 4-page Bulletin EC-287. Electromode Div., Commercial Controls Corp.

(60) FLUORESCENT LAMP. Buyer's Guide ATC-112 lists new ballasts for every lighting application. Advance Transformer Co.

ROYAL Portable Cords and Cables

Satisfy all your requirements . . . whether for extra heavy duty Type W power cable or light, flexible Type SJ cord.

Yes, one call gets them all! All types and sizes in all kinds of jackets . . . rubber, neoprene or thermoplastic. Lamp cords, fixture or machine tool wire . . . thermo or coaxial cables. All ROYAL and reliable!

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Royal Electric Company (Quebec) Ltd., Pointe Claire, Quebec

Permacel 295 Cold Weather Plastic Electrical Tape now guaranteed* to stick and stay at 0°F.! Remains flexible at temperatures down to 50°F. below zero.

* Money back and a new roll of tape if Permacel 295 does not perform as stated above.

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Reader's Quiz

QUESTIONS from readers on problems of industrial equipment, installations, maintenance and repairs. Answered by electrical maintenance engineers and industrial electrical contractors out of their experience. For every question and every answer published we pay $5.00.

Grounding Portable Filter Motors

QUESTION H40—A portable filter for a swimming pool has a 1/3-hp motor, single phase, 110 volts, and is plugged into an outdoor receptacle. The equipment—motor, pump, tank, etc.—is mounted on a steel carriage with rubber tires and is grounded through the cable and grounding-type plug and receptacles.

Somebody, who once got an unforgettable electric shock from an outdoor portable electric appliance, classified this arrangement as extremely dangerous. The ground around the filter is mostly soaking wet, due to splashing from the pool and leakage on the filter; and children of all ages are running around it.

Is the above installation foolproof, or are additional safety measures required or recommended? —J. A.

ANSWER TO H40—If the portable filter unit you are talking about is used in connection with a permanently installed swimming pool, the filter unit should also be permanently installed and connected with an approved fixed wiring method. In addition, the filter unit should be housed in a shed to protect electrical components from the outdoor elements. Furthermore, the circuit supplying the filter motor should include an individual, insulated grounding conductor, which is connected to the same grounding electrode as the service neutral. This grounding conductor will be connected to the frame of the 1/3-hp motor; and all other metallic parts, such as pipes and the tank and pump, should be bonded to this same ground so that they will all be at the same ground potential. This recommendation is patterned after proposals now being considered by a special technical committee studying ways and means of eliminating electrical shock hazards in and around swimming pools. The recommendations of this committee are scheduled to appear in the 1962 NEC after acceptance at the NFPA Electrical Section meeting next May.

On the other hand, the use of the portable filter unit you speak of may be in connection with a portable "collapsible" pool that is disassembled and stored away during winter months. While the portable filter unit is practical with this type of installation, the potential shock hazards are ever present due to the use of portable cords and outdoor receptacles. Frayed cords create a hazard even though they may be 3-conductor types. The grounding slot of the outdoor 3-pole grounding-type receptacle can become sufficiently corroded so that a high-impedance ground connection would be possible when the 3-pole plug is inserted. A subsequent fault in the motor could then cause a serious hazard to those persons who might touch the filter equipment. Everyone should know that proper maintenance of portable electrical equipment by competent electricians is highly unlikely, particularly in connection with residential equipment. Frankly, I don't like the installation as described in your question, and I think you should contact your local electrical inspection department for proper guidance in the matter. Above all, don't let anyone kid you that an auxiliary ground rod driven in the earth near the location of the portable filter unit will solve your problem if you bond the motor frame to the driven electrode. The only solution is to see that the motor frame and all related metallic parts are properly connected to a grounding conductor that runs to the same grounding electrode to which the service neutral is connected. And with a cord and receptacle connection, proper tests and maintenance will have to be made periodically to assure the the integrity of the all-important ground circuit.—B.L.N.

Pushbutton Station Outdoors

QUESTION J40—I have run into a controversy on the use of explosion-proof pushbuttons with ground flanges and bolted covers out of doors. Some people maintain the ground flange surfaces are not suitable for use in the rain, and others maintain they are. I have used this type successfully out-of-doors with no water getting in the enclosure, but I have always kept the flanged surfaces clean and greased. Will someone who has had experience with this type of equipment please give me their viewpoint.—W.E.G.

ANSWER TO J40—About three years ago we had this problem on our hands and after quite a bit of debate on the pros and cons relative to the "ground-flange joint" needing special care in removing covers, lost cap screws, corrosion, etc., someone came up with the idea of purchasing pushbuttons for "rain-tight-service." After investigation, we found the following:

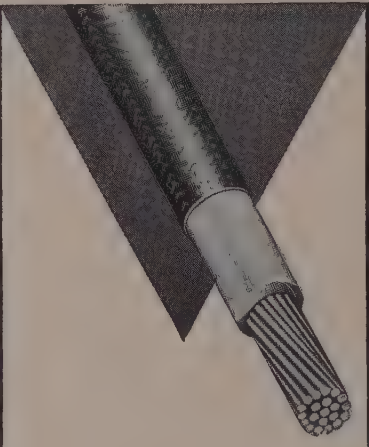
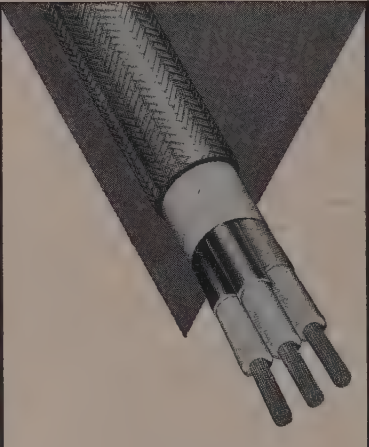
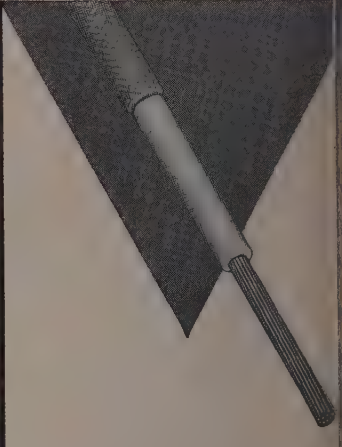
The pushbuttons with the "ground-flange joint" are listed as explosion-proof and dust-ignition-proof (dust-tight) only.

We changed the pushbuttons with the approved raintight enclosures for all wet locations and to date have had no trouble.—C.D.

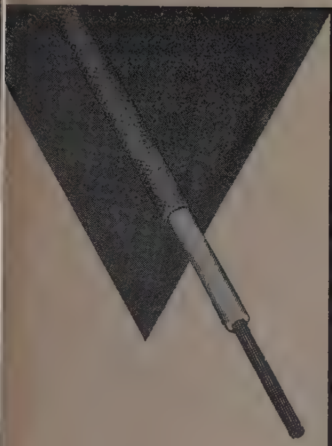
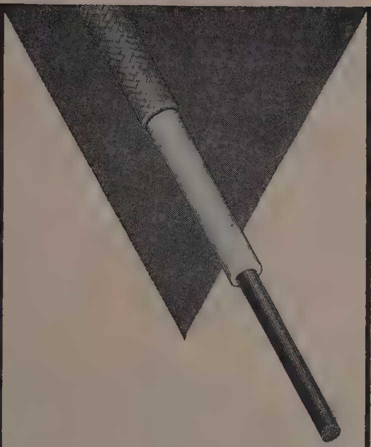
ANSWER TO J40—Competent design practices and proper performance include the selection of electrical equipment that is specifically constructed and tested for the environmental conditions under which it will be used. As an example, devices for Class I hazardous locations are not necessarily suitable for Classes II or III. Many of them are suitable, but if so, they are so listed. By the same token, any equipment designed solely for use in normally dry indoor locations should not be installed outdoors or in wet locations. Such is the case with your explosion-proof pushbutton station with the ground-flange cover. The ground-flange joint simply cannot be classified raintight, and therefore should not be installed where subject to a beating rain.

The only thing that remains is the availability of a raintight pushbutton device also approved for the respective hazardous location. Pushbutton enclosures of this type are manufactured by the Crouse-Hinds Co. and are referred to as their EWC series. The enclosure has a threaded cover and sealing neoprene construction for each external pushbutton. The EWC devices are UL listed for Class I, Group C and D

Rockbestos Silicone Rubber

	 POWER CABLE	 CONTROL CABLE	 APPLIANCE and FIXTURE WIRE
Voltage	600 and 5000 volt	600 volt	300 and 600 volt
Operating Temperature	125°C	125°C	150° and 200°C
Size Range	600V: #14 AWG to 500,000 CM 5000V: #8 AWG to 500,000 CM	#14 — #9 AWG	150°C: #22 to #18 AWG — 300 volt #22 to #10 AWG — 600 volt 200°C: #18 to #12 AWG — 600 volt
Construction	**Conductor** — Tinned copper, stranded **Insulation** — Silicone rubber **Covering** — Asbestos braid	**Conductor** — Tinned copper, stranded **Insulation** — 3/64ths silicone rubber, glass braid, color coded **Covering** — Cable tape, asbestos braid. Also available in galvanized steel, aluminum or bronze interlocked armor	**Conductor** — Tinned or nickel plated, stranded or solid **Insulation** — Silicone rubber **Covering** — Glass braid
Applications	Power wiring in high ambient temperature locations. Allows the most efficient utilization of the conductor. Satisfactory for installations in wet or dry locations.	Recommended where control or signal circuits are exposed to high ambient operating temperatures... steel mills, power stations, automotive, cement and glass plants.	For wiring of high wattage units, such as lighting fixtures, clothes dryers, sun lamps, stoves, electronic equipment, water heaters, ovens, and other apparatus.

Wire & Cable Selector

 **APPARATUS and MOTOR LEAD WIRE**	 **LIGHTING WIRE**
600 volt	600 volt
200°C	125°C
#20 to 4/0 AWG	#14 to #8 AWG
Conductor — Tinned copper, stranded **Insulation** — Silicone rubber **Covering** — Glass braid	**Conductor** — Solid tinned copper **Insulation** — Silicone rubber **Covering** — Glass braid
For leads to motors and transformers in high temperature locations. Stands up excellently under varnish dip and bake processes.	For lighting circuits in high ambient temperature locations.

Rockbestos Silicone rubber cables give you these outstanding advantages:

- excellent heat resistance 125°C-200°C allowable conductor temperature
- flame resistant—slowly forms non-conducting ash maintaining circuit integrity
- corona and ozone resistant
- maintains flexibility from —130°F to +500°F
- excellent resistance to oil, solvents, fuels and chemicals
- excellent electrical properties

ROCKBESTOS WIRE AND CABLE CO.
division of CERRO CORPORATION
Nicoll and Canner Sts., New Haven, Conn.

Gentlemen:

I would like to know more about the unique advantages of Rockbestos Silicone Rubber Wire and Cable. Please send me the following:

☐ The Rockbestos Silicone Wire & Cable Catalog.

☐ A sample of your silicone rubber wire.

☐ Please have distributor or salesman call.

Name____________________

Company____________________

Address____________________

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CUT OUT THIS JET LINE AD

CUT OUT THIS JET LINE AD

FREE
with this ad!

Get your On-the-Job Refill Attachment for JET LINE CYLINDERS

This is the only attachment you need to fill your own Jet Line Cylinders!

Simply CUT OUT THIS AD—take it to a Jet Line wholesaler—and he will give you—ABSOLUTELY FREE—the new complete Refill Attachment. There is no obligation on your part whatsoever.

This STARTLING NEW JET LINE DEVELOPMENT is safe and easy to use and is given with the compliments of Jet Line in the sole interest of saving time and money for you. Limited supply . . . one per contractor.

This free offer expires March 31, 1962.

JET-LINE® PRODUCTS, INC.
305 Foster Ave. Charlotte 3, N. C.

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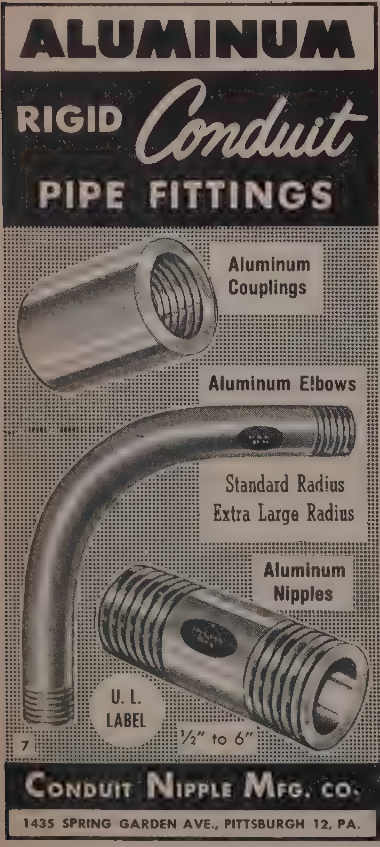

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RIGID Conduit
PIPE FITTINGS

Aluminum Couplings

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Standard Radius
Extra Large Radius

Aluminum Nipples

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½" to 6"

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Pat. 2632356

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UNIVERSAL

NAIL-IT
PAT. 2885169

The New Hump Drive-It Strap has a sturdy head to insure Easy-Drive without bending or pulling out. Made of No. 8 heavy wire. Zinc plating prevents rust.

ESSENTIAL FOR ELECTRICAL MEN

COPPER PLATED AVAILABLE FOR PLUMBER'S USE

WRITE FOR FREE SAMPLES

SOLD ONLY THRU LEADING ELECTRICAL WHOLESALERS

THIEL TOOL & ENGINEERING CO., INC.
1417 N. MARKET ST. LOUIS 6, MO

hazardous locations and Class II, Groups E, F and G. They also include NEMA designations of 3, 3R, 4 and 5, which means they are weatherproof, raintight, watertight and dust-tight. Devices of this sort, or those of equal construction, should be used in locations as described by you. This will prevent needless breakdowns and substantially reduce maintenance costs in the long run.

With your present set-up, you'll have to continue to keep the flanged surfaces clean and lubricated and hope for the best.—J.D.G.

Underground Conduit Wiring

QUESTION K40—We are planning on pulling three single-conductor, neoprene-jacketed 500 *MCM* 13.2-*kv cables through a* 100-*ft run of* 4-*in. steel conduit that connects a manhole to a building. This conduit has been empty for* 20 *years and is coated with rust, and there is evidence that debris and mud have been deposited in it by the water that is normally in the manhole. Can someone suggest a method for cleaning out the pipe effectively and also a type of pulling compound to facilitate the pull?—R.E.B.*

ANSWER TO K40—Don't. The conduit is too small in the first place. 5-in. conduit is the right size. It does not seem to be a good idea to use this conduit at all. A manhole normally filled with water does not sound too good either. Why not go overhead using triplex cable on a messenger.—K.H.

ANSWER TO K40—Actually, there are two parts to your question. The first pertains to cleaning out the underground conduit, and the second deals with how to pull three 500 MCM 15-kv conductors in the 4-in. conduit a distance of 100 ft. As to the first problem, there are many tools available through plumbing and sewer contractors that can readily remove obstructions (such as mud, water and rust) from the conduit. Such equipment can be rented from these contractors, or you may prefer to subcontract this phase of the work. However, before you attempt to go ahead with this first phase, you should consider the problem of pulling the specified wire in the conduit. Your 13.2-kv supply will call for conductors having insulation ratings of 15 kv. Checking representative dimensions of single-conductor, 15-kv 500 MCM cables, the average outside over-all diameter is 1.75 in. This would mean that the cross-section area of each conductor would be about 2.40 sq in., since $D^2 \times 0.7854 = \text{CSA}$. Thus, the total cross-sectional area for the three conductors would be 7.20 sq. in. For a 43% conductor fill of a 4-in. conduit the value is 5.47 sq in., and for a 50% fill the value is 6.36 sq in. As a result, it is obvious that the three conductors in question would occupy about 57% of the 4-in. conduit, which is too much to expect. In other words, before spending a lot of time and money, check with the cable manufacturer you have in mind, and find out from him what the actual outside dimension of the proposed cable is. In no case should the total conductor fill exceed 50% (the maximum for rewiring existing conduits), and for a 100-ft run, the fill should be about 40% to provide maximum protection for the installed conductors. Any number of good wire-pulling compounds are available.—J.C.H.

Can You Answer These QUESTIONS?

QUESTION S40—In the past we have been running thermocouple wiring consisting of instrument signal leads, approximately 5 millivolts in one conduit and instrument control piping, ¼-in. plastic tubing with 3 to 15 psi air supply in another conduit. The question is: Is there any rule or reason why we cannot combine the thermocouple wiring and instrument control piping in the same conduit? This results in a savings of one conduit run. Has any reader come up against this situation before? If so, I would appreciate your comments.—C.D.

QUESTION T40—In the application of photoelectric tubes in industry, is there any way of checking these tubes in the field? What circuit should be used in checking these?—V.S.

QUESTION U40—What is the difference between capacitors designed alternating current and direct current in construction features and application?

Can the two types be interchanged and if so, what are the limiting factors?—J.B.K.

PLEASE SEND IN YOUR ANSWERS BY JANUARY 15

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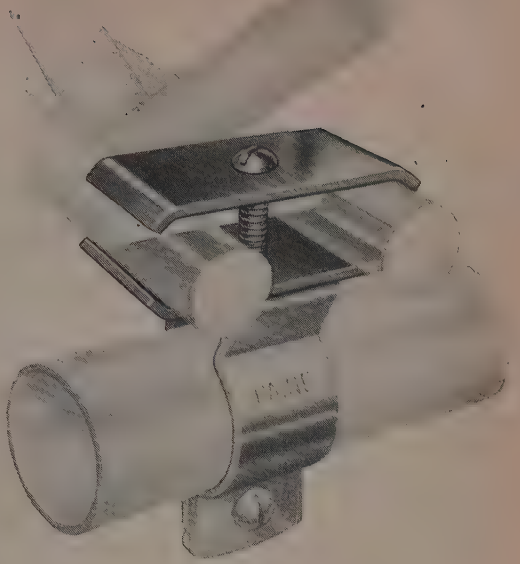

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WT61-9

SPECIFICATIONS

Type AE—Single Phase—1 to 10 Kva 80° C Rise, 60 Cycles.

High Voltages: 120 x 240; 240 x 480; 600 volts, no taps; 480, 600 volts, 2—5% taps below normal.

Low Voltage: 120/240 volts.

KVA	DIMENSIONS IN INCHES			NET WEIGHT POUNDS	AVERAGE SOUND LEVEL DECIBELS
	Height	Width	Depth		
1	10 13/16	6 5/16	6 3/16	28	37
1½	11 13/16	6 5/16	6 3/16	34	38
2	13⅛	6 13/16	7 3/16	46	38
3	14⅛	6 13/16	7 3/16	62	39
5	15 9/16	9¾	9¼	93	39
7½	16 1/16	9 11/16	10 7/16	130	39
10	17⅛	11⅛	10¼	167	39

Questions on the Code

Answered by:

R. L. LLOYD, *Electrical Safety Engineer, National Bureau of Standards, Washington, D. C.*
B. Z. SEGALL, *Consulting Electrical Engineer, New Orleans, La.*
R. E. WARD, *Chief Electrical Inspector, Insurance Department, State of Tennessee, Nashville, Tenn.*

READERS are invited to submit questions regarding the National Electrical Code and its practical application to this Department. Questions are answered by the consulting editor whose initials appear at the end of each item. The views and opinions expressed are, in each instance, those of the individual consultant replying and are not necessarily those of his employers, of this publication or of a Code-making committee or panel on which he may serve in an official capacity.

Conductor Ratings

Q. *Does the Code allow full ratings on conductors of* 60C *and* 90C *insulation that are installed in the same raceway?—B.K.*

A. No. Section 110-4, examination of equipment in paragraph (d) specifically requires that all equipment shall be judged for "heating effects under normal conditions of use and also under abnormal conditions likely to arise in service."

Under normal use any equipment which is wired so that both 60C and 90C insulated conductors are within the same conduit system as outlined in this question would surely cause the 60C insulation to be heated above its 60C rating due to the dissipation of the higher temperature from the 90C insulated conductors.

Section 310-4, temperature limitations, emphasizes that "No conductor shall be used under such conditions that its temperature even when carrying current, will exceed the temperature specified in Table 310-2(a) for the type of insulation involved."

Finally Note 6 to Tables 310-12 to 15 stresses the requirements for ultimate insulation temperature. "In no case shall conductors be associated together in such a way with respect to the kind of circuit, the wiring method employed, or the number of conductors, that the limiting temperature of the conductors will be exceeded."—B.Z.S.—12/1/61

Heating Cable

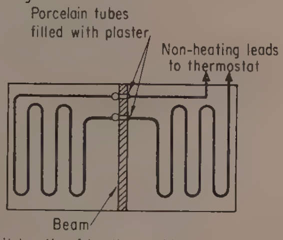
Q. *In many of the homes being built today with large rooms such as dens and family rooms, false wood beams are installed to break up the length of the ceiling and add decor.*

In installing electric cable heat in the ceiling of such an installation, what is an approved method of installing the cable through such beams?—Q.L.B.

A. Your question is one that is not directly answered by the NEC, but which could cause trouble if a proper installation is not made. We have had experience with a number of jobs such as you describe.

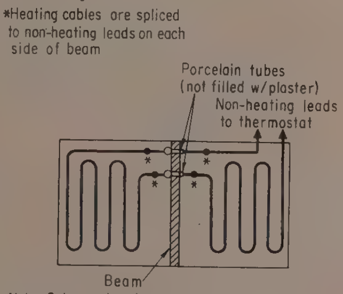
The recommendation of at least one manufacturer of heating cable is to drill holes through the false beams, as shown in Fig. 1. The heating cable runs through porcelain tubes, which extend through the beam. Then the void between the insulation of the wire and a porcelain tube is filled with the plaster material in the same manner that is used for embedding the cable on the ceiling proper. The entire heating cable should be embedded with the plaster mix in order that heat may be transferred from the heating cable to the plaster.

Fig. 1


Porcelain tubes filled with plaster
Non-heating leads to thermostat
Beam

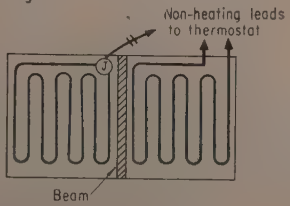
One unit length of heating cable

Fig. 2


*Heating cables are spliced to non-heating leads on each side of beam
Porcelain tubes (not filled w/plaster)
Non-heating leads to thermostat
*
*
*
*
Beam

Note: Only non-heating leads pass through beam. One unit length of heating cable

Fig. 3



Two unit lengths of heating cables (one on each side of beam)

Another accepted method, shown in Fig. 2, is to splice the cable to nonheating leads on each side of the beam. Then only the nonheating leads will pass through the beam. We recommend the first method in preference to the second.

Fig. 3 shows the method that we feel is best of all. In this instance two cable units of proper wattage are used instead of one. As a result, no heating cable need pass through the beam. — R.E.W. — 12/2/61

Buildings Under Single Management-Disconnects

Q. *For two or three years we have been seeking a better understanding of the intent of the NEC concerning Sections* 230-76 *and* 373-8.

Section 230-76 *requires an accessible service disconnect "within or adjacent to" each building served when a property comprises more than one building under single management. For this same installation Paragraph* 230-90 *(c) permits the overcurrent devices to be located "in the building served or in another building on the same property." Are other accessible buildings owned by the same company considered to fulfill the "adjacent to" requirement of Section* 230-76*? If not, it seems odd that the overcurrent devices might be located in one building and the disconnect in another.—E.A.G.*

A. For the convenience of our readers the provisions of Section 230-76 are quoted as follows:

INSIST ON ALL THESE VALUE-

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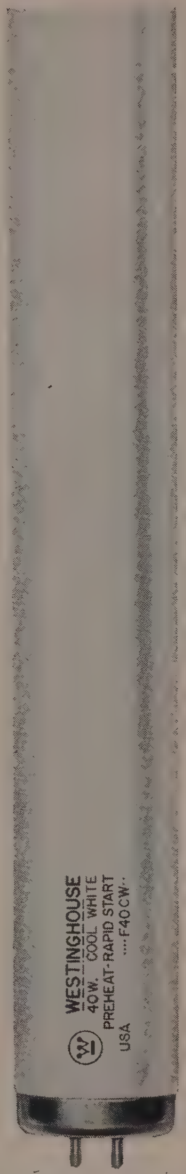

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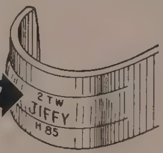

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"More Than One Building. In a property comprising more than one building under single management, the conductors supplying each building served shall be provided with a readily accessible means, within or adjacent to the building, of disconnecting all ungrounded conductors from the source of supply. In garages and outbuildings on residential property, the disconnecting means may consist of a snap switch, suitable for use on branch circuits, including switch controls at more than one point."

The provisions of Paragraph 230-90(c) are quoted as follows:

"More Than One Building. In a property comprising more than one building under single management, the ungrounded conductors supplying each building served shall be protected by overcurrent devices, which may be located in the building served or in another building on the same property, provided they are accessible to the occupants of the building served."

The 1940 Code version of Section 230-76 recognized the location of the switch or circuit breaker in the building served or in another building, provided it is accessible to the persons using the installation. When the 1946 Code version appeared, as above quoted, the phrase "within or adjacent to the building" was the source of considerable controversy. The word "adjacent" is ambiguous in the absence of any advice which covers the intent. Would a switch located on a pole within 5 ft of the building be considered as adjacent? According to the NEMA analysis of the revision of the 1946 Code, the following comment is an expression of intent:

"The only change in intent is the provision to use a snap switch instead of an enclosed externally operable switch in certain cases."

This opinion indicates regardless of the use of the word "adjacent" that the switch required could be located in the building served or in another building, provided it is accessible to the person using the installation. This concept of code intent appears to be verified to some extent by Official Interpretation No. 313 issued December 19, 1948. It is quoted as follows:

"Disconnecting Means in Residential Garage."

"Question: With respect to a garage, is it necessary to construe the term "adjacent to the building" of Paragraph d of Section 2351 (230-76) so as to prevent placing the disconnecting means at the house instead of at a detached garage on the same premises?

"Finding: No, the intent was to follow the practice specified in the 1940 edition of the code."

While the foregoing observations appear to clarify the intent of the word adjacent, a question arises with respect to the phrase "each building served shall be provided with a readily accessible means—of disconnecting all ungrounded conductors from the source of supply." Official Interpretation No. 456 released June 11, 1959, covers this question as follows:

"Statement: A mill consisting of four buildings under single management is supplied from a 440-volt line through an 800-amp circuit breaker. The supply line goes first to a building where a 1,000-amp bus is tapped to supply overhead wires to three separate buildings. The 800-amp main circuit breaker is mounted some distance away from the first building and controls a run of 750,000 circular mil conductors in parallel. The tap from the 1,000-amp bus in the first building to overhead wires is 500,000 circular mils. Individual switches control the taps to each of the three secondary buildings.

"Question No. 1—Would the 800-amp circuit breaker mounted some distance from the first building be readily accessible under the intent of Paragraph d of Section 2351 (230-76)?

"Answer:—No.

"Question No. 2—Are the 500,000 circular mil cables between the busbar in the first building and the overhead wires properly protected by the main 800-amp circuit breaker?

"Answer:—No.

"Question No. 3—Does Section 2302 apply to this combination of buildings under single management?

"Answer:—Yes."

In the absence of the considerations involved with this finding, one may only speculate, and I believe the phrase "some distance away from the first building" was a factor which influenced the decision. The word "some" is an indefinite quantity which could vary from a few feet to infinity. If the distance was covered in terms of feet or yards, the finding might have been different and significant toward the clarification of code intent.

In so far as the provisions of Paragraph 230-90(c) are concerned, the overcurrent devices may be located in either building, provided they are accessible to the

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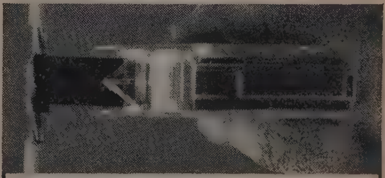

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Webster's Dictionary defines it as "the accomplishment of a purpose." Must it not also bring dignity, happiness and the recognition of our fellow man—in short, the qualities that add stability and continued growth to perpetuate that success?

When viewed along these broader lines, we must admit that basic qualities along moral lines must accompany financial success to bring happiness to ourselves and stability to our business. When we receive our customers' money (which is actually an exchange for his services and value stored up in the dollar) we must in turn render him our own honest services. Furthermore, they must fulfill a definite requirement of our customer in a positive way to enhance his life or business. Only by serving better in these respects can we hope to ATTAIN and RETAIN our customers and achieve prosperity.

In my next message I will tell you how we work towards this goal at EAGLE.

In the meantime I want to extend to all our friends in the industry my best wishes for a happy and prosperous New Year.

Louis Ludwig
President

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occupants of the building served. Here again the question of access is involved. Regardless of the wording of this rule, it appears evident that the feeder to the building served must be protected at the supply building. If the location is not considered to be accessible, another overcurrent device must be installed at the building served. It is significant to note that "readily accessible" applies to the switch, and "accessible" applies only to the overcurrent device. Reference to the definition of accessible indicates that the question of distance is not involved. It appears, however, that the term "readily accessible" involves distance.

In view of the foregoing observations, it appears to me that the question raised comes within the scope of the inspector who, according to Section 90-7, shoulders the responsibility for interpretation of the rules.—B.A.McD.—12/3/61

Conductor Clearances

Q. *Our company has built a feed silo on farm property with a metal ladder attached to the side of this silo, the ladder being the closest part of the structure to a 2300-volt power line on a wood structure with span length at the silo of 120 ft. The closest distance between a conductor and the ladder is 6 ft. 4 in. The property owner has requested our company to install a circular metal cage enclosing the ladder for protection of any person climbing the ladder from falling, as well as making contact with the power line with a tool or object the person might carry up the ladder. The cage will extend 24 in. away from the ladder, leaving a clearance of 4 ft., 4 in. from the closest conductor to the enclosure.*

Will the above clearance meet the requirements of the NEC for such an installation?—E.M.

A. Article 730 of the NEC does not cover clearances for conductors over 600 volts; however, Article 730 does have a fine print note which refers to the National Electrical Safety Code. Section 234-C of the National Electrical Safety Code, concerns clearances from buildings. Section 234-D covers clearances from bridges. The clearances required for voltages up to 8700 in both instances is 3 ft where such spans do not exceed 150 ft in length. The above clearances from buildings and bridges are as near to your installation of a silo as I can find; and according to your statement, voltage and span length are under the allowable maximum.

There are also provisions for guarding, and I would consider the enclosure as a method for guarding.

With the clearance of 4 ft, 4 in. from conductor to closest part of the enclosure, I would say that this would comply with the rules previously quoted.—R.E.W.—12/4/61

Official Interpretation

An interpretation of a section of the National Electrical Code has been announced by the National Electrical Code Committee of the National Fire Protection Association, effective Sept. 14, 1961. The interpretation has been developed through the established committee procedure in response to requests and has been reviewed and released by the NFPA Electrical Correlating Committee.

Subject matter and official text of the interpretation follow:

INTERPRETATION NO. 470
(Article 520)

Subject—Whether or not small restaurants having stage facilities are included within the scope of the entire NEC Article 520 which deals with theaters and assembly halls.

Statement No. 1: A restaurant having a seating capacity of less than 200 persons has stage equipment and other arrangements for providing entertainment for its customers.

Question No. 1: Is it the intent of Section 520-1 that such a restaurant be subject to the requirements of Article 520?

Answer No. 1: Yes.

Statement No. 2: A restaurant having a seating capacity of less than 200 persons has no arrangements for providing any form of entertainment for its customers.

Question No. 2: Is it the intent of Section 520-1 that such a restaurant be subject to the requirements of Article 520?

Answer No. 2: No.

Comment: It is intended that the provisions of Article 520 apply primarily to those occupancies where stage facilities are provided. The seating capacity of the occupancy is related only to the provisions of Section 520-4.

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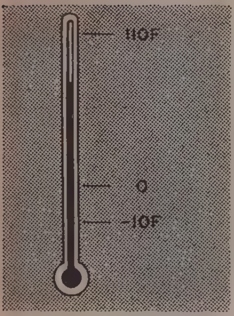
It may seem funny that the truck that can't freeze up or boil over only costs $1,895,* while trucks that cost several hundred more can still be seen by the side of the road.

On the other hand, you may not think it's funny at all.

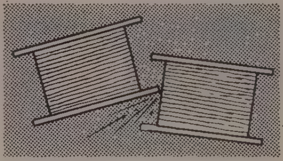
It all depends on which one you have.

CABLE TALK

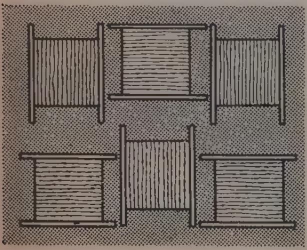
6 tips to help you save money on cable installations

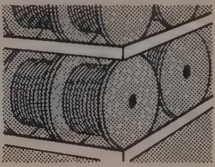


1. Avoid extreme temperatures—below 10F and above 110F (unless cable is specifically designed for this purpose). Low temperatures are seldom harmful to cable, but when they are combined with impact, flexing or other mechanical action, it's possible that the cable may be damaged by cracking, flaking or complete rupture of the coverings. Excessively high temperature, all by itself, can materially shorten the potential service life of stored cable. Thermoplastic components may soften and flow; rubber and many other materials undergo chemical and physical changes at high temperatures. You can avoid this problem by not storing cable near heating units, steam pipes, etc.

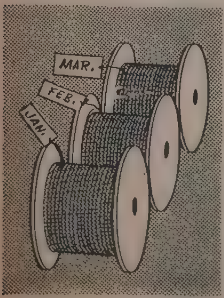


2. Avoid mechanical impact and crushing. Wire on a reel can be rendered useless by allowing the flange of another reel to crash against it. Arranging the stored reels in a crosshatch pattern is the simplest way to avoid this kind of accident. If space is at a premium, the reels may be stored in trays that allow only the flanges of adjacent reels to contact.



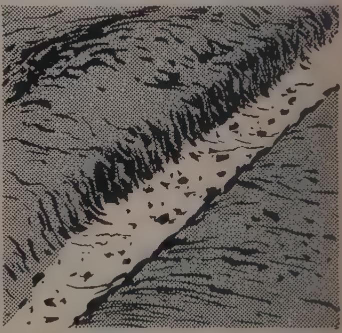


3. Use the oldest stocks first. Very few materials improve with age, so the sooner you use stored cable the longer it will last in service. Also, the less time a cable spends in storage, the less chance there is for damage. Keep rotating stocks so that the newest cable goes to the end of the line.



4. Swab conduit before pulling wire
A remarkable amount of abrasive material—nails, glass and such—can accumulate in conduit, pipe or duct before the wire is pulled through. And pulling a wire or cable through such litter could damage it severely. If you pull a swab through the conduit ahead of the wire to clear the way, you'll eliminate a big source of hidden installation damage.

5. "Direct burial" doesn't mean "on top of anything"
The specification "direct burial" on a cable doesn't mean that you can afford to bury the cable directly on top of whatever you might find in the earth. Trenches should be cleared of rocks and broken glass before the cable is buried. Freezing and thawing can make rocks shift position, and, possibly, exert enough pressure on the cable to cause premature failure. The same danger exists when wires that cross underground rest on each other. Moral: clear trenches before burying cable, bed the cable in sand, and keep crossed cables separated.



6. Pick the strongest component when pulling cable
When wire or cable is being pulled-in, either through conduit or aerially on poles, it's essential to put all the pulling tension on the strongest part of the cable assembly. Ordinary single-conductor material should have pulling tension applied to the bare conductor. Applying tension to the covering materials tends to stretch them, and can lead to breaks in some cases. Always pull preassembled aerial cables by the messenger, not by the insulated conductors. Interlocked-armor cable should never be pulled by the armor, since this may cause severe damage by unlocking the armor.

* * *

This collection of ideas comes from many years of probing into wire and cable problems—and solving them. It's likely that we've come across some problems just like yours, and together we could probably work out a fine solution. So, please give us a call, or write Anaconda Wire and Cable Company, 25 Broadway, New York 4, New York. Department EFL-1-ECM. 61304

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Inspectors' Regional Conferences Held

New code rules and interpretations are explored in section meetings of the IAEI.

MEMBERS of the International Association of Electrical Inspectors held their annual series of section conferences during September and October.

NW AND SW SECTION

Several code-related headaches were acknowledged by some 400 delegates who collectively attended sectional conferences held by the International Association of Electrical Inspectors in Boise, Idaho, Sept. 10-13, and in Long Beach, Calif., Sept. 18-21. At these successive northwest and southwest meetings, problems meriting serious debate included non-interchangeable circuit breakers, the fallacy of ground returns in arid regions, service labeling practices, insufficient inspection and maintenance space around electrical equipment, and conflicting interpretations of various code rulings in various parts of the country.

The northwest meeting was aptly programmed by general chairman Park H. Forte, Boise chief inspector; section president E. M. Tubbs, Bellingham chief inspector, and by secretary-treasurer W. L. Gaffney, Tacoma. The southwest conference was managed by general chairman L. E. LaFehr, Alhambra; section president Arthur Vesco, San Diego chief inspector, and host Charles D. Metzger, Long Beach chief inspector.

OUTGOING PRESIDENT of IAEI's southwestern section, Arthur Vesco (rostrum), relinquished title to former vice president, Charles R. Pierce, who was elected to that office at recent conference in Long Beach, Calif.

Subjects of general interest were discussed at both meetings by International President G. C. Monroe, Springfield, Mo.; IAEI Secretary-Treasurer E. F. Cogan, Chicago; NFPA Field Engineer Frank Stetka, and Leslie Price of NEMA. In addition, Karl S. Geiges, vice president, Underwriters' Laboratories, spoke at the Boise meeting, reviewing many problems encountered on the west coast, while at Long Beach the program was rounded out by Kent P. Stiner who represented ITE's BullDog Division from Detroit.

In this series of talks, President Monroe reviewed Association growth and management, recommending employment of an international managing director and secretary to handle the growing amount of detail work related to IAEI administration. He also advocated a more expansive and realistic public-relations attitude towards manufacturers and other segments of the industry who, although now permitted to attend meetings, were not always cordially welcomed.

With delegates supplied with pre-print copies of the proposed 1962 Code, Frank Stetka drew attention to recommended changes; explaining why some proposals had been rejected and why others had been referred to various code-making panels for further study. Rulings which had been tentativly approved were reviewed as to intent and purpose.

With the deadline for final approval close at hand (Dec. 1) Stetka commended the amount of effort which is being expended by panels such as those related to machine tools, electronic computer systems, mobile homes and trailers, swimming pool lighting and hospital emergency electric systems. He also commended the work of technical subcommittees considering overcurrent protection associated with high-current capacity networks, and characteristics of heating cables installed for purposes of de-icing.

IAEI'S NEW PRESIDENT E. M. Tubbs, Bellingham chief inspector, and northwest Secretary-Treasurer W. L. Gaffney, reviewed sectional activities of past year at annual meeting in Boise, Idaho.

The subject of non-interchangeable breakers brought out the fact that, with the introduction of thinner breaker components, it was now possible to stack 60 or more switches in panels designed for 42 circuits; this practice thereby overloading bus structures and feeders of specified sizes. Manufacturers were urged to make products which "could not be tampered with." In rebuttal, manufacturers' representatives countered with the argument that that responsibility hinges upon more rigid inspection, since *any* current-rated device can be overloaded if recommendations are ignored or not enforced.

During a subsequent discussion, Leslie Price, manager, engineering and safety reglations, NEMA, New York, gave credit to contributions of Underwriter's Laboratories, a nonprofit organization which was respected by the public and all branches of the industry; contrasting their unique service function with European practices dictated by government codes.

Problems Defined

As an "added starter" at the Boise meeting, Geiges stated that a westcoast problem formerly had pertained to the installation of wall-inserted space heaters, where copper reflectors had oxidized and thereby had become primarily heat-transfer mediums rather than reflectors. Changes in design and use of aluminum are now remov-

NEW OFFICERS of the Western Section, IAEI, elected at recent 57th Annual Meeting in Oklahoma City are: (L to R) secretary-treasurer—D. M. Lines, Topeka, Kans.; president—H. B. Love, Detroit, Mich.; 1st vice president—E. E. Patterson, Oklahoma City, Okla.; 2nd vice president—C. B. Tressel, Canton, Ohio.

EXECUTIVE COMMITTEE of the Western Section, IAEI, has representatives from five states. They are: (L to R) S. M. Sanford, Minneapolis, Minn.; E. H. Rueppel, Louisville, Ky., representative on the International Executive Council; R. G. Pullen, Indianapolis, Ind.; A. A. Sommer, Chicago, Ill.; E. J. Loesch, Cleveland, Ohio; and (not in photo) R. S. Davis, Detroit, Mich.

ing this problem, he added. He also cited cases where panelboards had faulted due to loose connections, and advocated exact identification of all connection lugs on trailers and mobile homes. In this connection he stated that many mobile units now have electrical loads equivalent to small permanent homes, and serious danger can develop by making improper connections on split-bus receptacles where 230 volts rather than 115 can be contacted due to misapplication. Other interesting comments pertained to lighting fixtures designed specifically for low-density cellulose ceilings; the possible mismatching of receptacles and polarized caps; baseboard heating elements where fires may result in the event that rugs or wall-to-wall carpeting come in contact with heating components; swimming pool lighting fixtures backed by fused transformers, and testing problems associated with foreign-made electrical products.

Kent Stiner analyzed various factors in motor operation and protection, stating that although both breakers and fuses give short-circuit protection for motor circuits, some breakers open faster under excessive currents and therefore offer greater assurance of less damage to circuit components; adding that instantaneous trip breakers are not affected by such things as ambient temperatures, fluctuating loads or number of motor starts.

Also at the Long Beach meeting, Arthur Vesco urged a higher degree of communication between chapters so that conflicting interpretations of code rulings would not exist in various parts of the country. He also cited that growing complexity of electrical materials, equipment, installation methods and techniques now existent; warning inspectors not to judge new compact assemblies by old inspection standards by which, in many instances, safety had been judged by a product's physical bulk.

Proposed code changes were discussed at the Long Beach Conference by three workshop groups concerned with residential, commercial and industrial rulings; conclusions then being reported to and debated by the entire conference in subsequent sessions. This procedure was conducted under the guidance of general code chairman Charles R. Pierce, Fresno chief inspector; assisted by workshop chairmen Paul Davison (residential), Delbert H. Hansen (commercial) and A. W. Pollock (industrial). These sessions resulted in several recommendations for future consideration, such as provision of adequate working space and guarding mediums around electrical equipment; identification of grounding terminals in receptacles and attachment caps; also approval of liquid-tight flexible metallic conduit in sizes up to 3-in.

With so many members of correlating committees present at the Long Beach conference, L. S. Inskip, Bell Telephone Laboratories, chairman of Panel 5, called a special added session to discuss grounding proposals. Interest was attested by a large atendance; the resulting discussion revealing that the inadequacy of earth grounding (existent in arid areas such as the southwest) was now being compounded since water mains were being insulated or replaced by plastic conduit, thereby elminating this medium as an alternative grounding agent. Inspectors present felt that utilities should be responsible for providing additional circuit-related grounding conductors of sufficient size to guarantee safe passage of fault currents, whereas utility representatives countered with the argument that this would be both complicated and costly, since many present services are 3-wire 3-phase, without neutral, and that metering facilities for these installations also are designed for only three conductors.

In electing officers for the coming year, the northwestern section promoted Eldon L. Shirley from first vice president to president, to succeed Edward M. Tubbs; Loren Christensen of Salt Lake City becoming first vice president; Mark Lundy of Idaho State second vice president, and W. L. Gaffney being re-elected as secretary-treasurer.

Elections at the southwestern meeting moved Charles R. Pierce from first vice president up to the office of president, with Paul Davison of Mesa, Ariz., becoming first vice president; Walter Reed of Orange County, Calif., second vice president; Delbert Hansen, Oakland, third vice president, and Lou LeFehr of Alhambra being re-elected as secretary-treasurer.

WESTERN SECTION

The Western Section, IAEI, encompassing 18 states, held its 37th Annual Meeting Sept. 25-27 in the Sheraton-Oklahoma Hotel, Oklahoma City, Okla. More than 570 members and guests participated in the 3-day educational program. Many sessions were devoted to panel discussions of proposed amendments to NEC and problems of interpretation.

Section President W. P. Hogan,

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Jr., Chicago, set the stage for a working conference when he reminded registrants that they were the electrical safety representatives of some 65 million people residing in the geographical areas covered by the Western Section. The basic reason for a meeting of this type is to learn from each other, to teach and to exchange information, he noted. Hogan emphasized that an inquisitive attitude and frank expression of opinion on code intent and interpretation is doubly important this year with the 1962 NEC in the making.

International President George C. Monroe, Springfield, Mo., reviewed IAEI organizational progress to date, noted changes that have become effective, offered recommendations for the future.

International Secretary-Treasurer E. F. Cogan, Chicago, reported a total membership of almost 8,500; chartering of two new Chapters (North Dakota, New Hampshire); and a healthy financial condition. He recommended a new system of dues renewal; was supported by a Western Section motion moving the deadline date up from April 1 to February 1. Mr. Cogan also revealed that the IAEI Committee on Non-interchangeability of Circuit Breakers is being revitalized. The committee plans to meet with NEMA to discuss differences of opinion and suggest code clarification on the subject.

C. Don Snyder, president, Wetherbee Electric Co., Oklahoma City, discussed the NECA-IBEW Apprentice Training program in effect in Oklahoma City and Tulsa; also the "post-graduate" training available to journeymen.

The importance of Underwriters Laboratories to the electrical industry was recounted by H. P. Michener, NEMA, New York City, who contrasted U.S. regulations and test procedures with the European pattern of centralized government-controlled safety regulations and requirements.

Action on Code Changes

The first panel session was devoted to a study of the proposed amendments of the 1959 NEC as listed in the NFPA Preprint No. 70-PR. With this book as a guide, panel chairman Frank Stetka and Code Making Panel members explained the changes, section by section. Floor questions were answered and rule clarifications offered by Kent Stiner, Detroit; J. B. Whitaker, New York; H. H. Watson, Bridgeport, Conn.; L. S. Inskip, Murray Hill, N. J.; and O. K. Coleman, Lafayette, Ind. A number of amendments generated considerable floor discussion, led to additional study and resulted in Section action through formal motions. Approved motions expressing inspector concensus included the following:

IAEI PRESIDENT, George Monroe, addresses the 37th annual meeting of the IAEI Eastern Section held in Philadelphia, Pa., October 9 to 11.

Circuit Breaker Marking—Opposition to proposed Section 240-25(f) permitting optional marking of circuit breaker interrupting rating on the breaker until Jan. 1, 1965. Inspectors want the ratings clearly marked on the breaker.

Fixture Wiring—Suggested clarification of wiring in fluorescent fixture raceways by clearly stating that Type RH and RHW conductors are not recognized as 90°C wire (Section 410-29 in preprint).

Tap Length—Opposition to any extension or change of the present 25-ft rule for tap lengths. There is a proposal still on the docket (Section 240-15, Exception No. 6) to change this distance to 50 ft.

Elevator Rectifier—Opposition to CMP 2 action approving insertion of phrase "on each elevator controller" after words "means shall be provided" in Section 620-91 until full economic as well as engineering facts have also been determined. This proposal is still on the docket.

Switchboards — Approved appointment of an IAEI committee to meet with NEMA and UL representatives to explore problems and develop practical safety standards for switchboards, panelboards, and motor control centers.

The subject of double-insulation on portable appliances and the proposed code change eliminating the grounding conductor on double-insulated wet-scrubbers generated healthy floor discussion. While many inspectors voiced opposition to the change, the majority decided to go along with the CMP action when told of the reasoning behind it.

Code intent and interpretation highlighted the forum session on field problems. H. B. Love, chief electrical inspector of Detroit, chairmanned a panel answering submitted questions from the audience. Panel members included J. E. Fisher, Elkhart, Ind.; Gordon Maltby, Evanston, Ill.; and R. J. Thompson, Oklahoma City. A number of inspectors reported considerable abuse of circuit breaker interchangeability. Twin breakers are being substituted for single breakers in panelboards causing increase in panelboard capacity and overloading of the panel bus and feeders. Following lively floor discussion, the general concensus was that something has to be done to stop this practice. Safety regulations and voltage limitations for swimming pool lighting also came up for considerable discussion. Taking notes was the rule throughout this session as inspectors recorded experiences of others in field problems of mutual interest.

At the concluding business session, Western Section members elected, by unanimous vote, a slate of officers for the coming year. H. B. Love, Detroit, is the new Western Section president. Chosen to serve with him were: first vice president —E. E. Patterson, Oklahoma City; second vice president—C. B. Tressel, Canton, Ohio; secretary-treasurer—D. M. Lines, Topeka, Kansas.

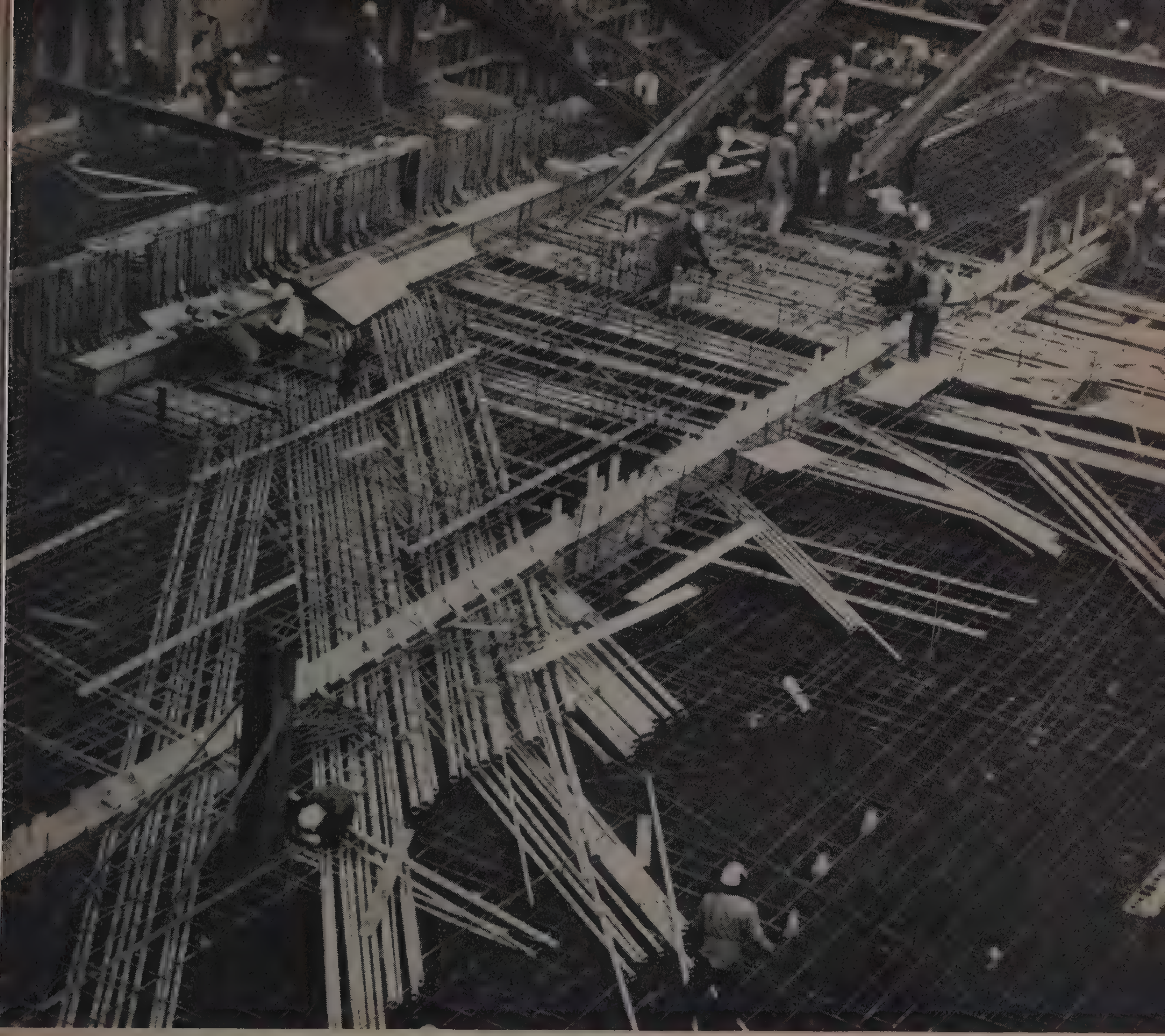
1962 meeting will be in Chicago.

EASTERN SECTION

The Eastern Section of the International Association of Electrical Inspectors held its 37th annual meeting in the Warwick Hotel, Philadelphia, Pa., October 9 through 11. A well-planned 3-day program included addresses by industry authorities and the always-popular code discussion sessions. In addition, leading manufacturers exhibited a number of new electrical products.

At the meeting, J. W. Mannix, electrical inspector for Belmont, Mass., was elected president of the Eastern Section for 1962, succeeding J. D. O'Donnell, New York City. Other officers elected included C. L. Kelly Sr., Bridgeport, Conn., first vice president; R. L. Lloyd, Washington, D. C., second vice president; V. E. Klein, Syracuse, N. Y., third vice president; G. B. M. Robertson, Philadelphia, Pa., fourth vice president; and R. A. Jutstrom, South Weymouth, Mass., secretary-treasurer.

G. C. Monroe, 1961 IAEI international president, Springfield,



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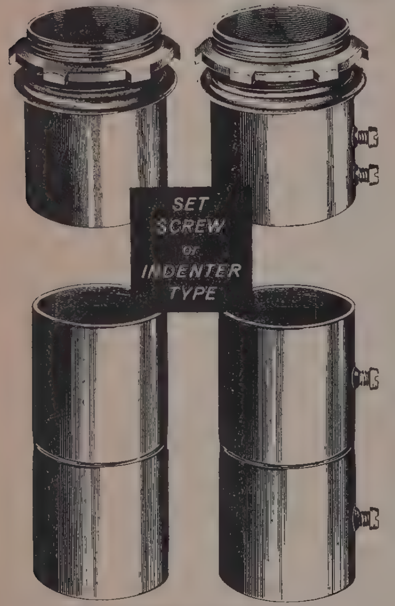
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Mo., delivered a major address to the convention in which he pointed out some of the major problems presently facing the association. First, he stated that plans are under way to hire a Managing Director for the IAEI. This newly created position will help to relieve the work load in the international office brought about by increased service to the membership. At the same time the Managing Director will be able to develop a better understanding and closer cooperation between the IAEI and other electrical groups. Monroe also stated that the IAEI is embarking on a program to finalize plans for an adequate educational program for electrical inspectors, which is aimed at improving their status in the eyes of the public and the electrical industry. He further mentioned that the IAEI has 8500 members at present, which includes all classes of membership.

Other reports were given by E. F. Cogan, IAEI secretary-treasurer and Frank Stetka, NFPA electrical field engineer, both from Chicago, Ill. Stetka's remarks included an appeal to IAEI members to obtain a copy of the "Proposed Amendments of the 1959 Edition National Electrical Code," designated as NFPA No. 70-PR and available from the NFPA, 60 Batterymarch St., Boston, Mass. He stated that this publication contained valuable discussions by code-making panel members and others concerning reasons for approving or rejecting proposals for code changes. With such background information, it affords code users an excellent opportunity to grasp the intent of new code proposals, he added.

The eight formal talks presented at the meeting were as follows: "National Electrical Contractors Association and Code Developments" by C. J. Hart, research engineer, NECA; "What Underwriters' Laboratories Means to the Electrical Industry" by R. W. Shaul, senior engineer, NEMA; "United We Stand" by A. W. Hooper, executive director, NAED; "Proposed revisions in Article 250 for the 1962 NEC" by L. S. Inskip, chairman of CMP No. 5; "Interior Fire Alarm Systems" by B. H. Breedlow, industrial sales manager, Gamewell Co., "Remarks on NFPA 79T Tentative Electrical Standards for Machine Tools" by S. Cowan, Factory Insurance Assoc.; "Clearing Ground-Fault Currents" by E. C. Soares, consulting engineer, Pringle Electrical Manufacturing Co.; and "Armored Cable" by F. Dias, production manager, Simplex Wire and Cable Co.

A. D. ROSS FRASER (right), president Rome Cable Div., ALCOA, Rome, N. Y., stands to hear the citation read by R. Stafford Edwards (left), president, Edwards Company, Inc. and a member of the Committee of Awards of the James H. McGraw Award for Electrical Men. Mr. Fraser received the McGraw Award Manufacturers Medal and Purse at the annual meeting of NEMA on November 16 at New York City for "his dedicated and forceful leadership of the National Electrical Manufacturers Association toward re-asserting traditional ethical standards and building public faith in the industry and its place in the national economy."

Four code clinics were held during the 3-day meeting with code discussions touching on grounding, branch circuits, feeders, services, transformers, overcurrent protection, conductors, hazardous locations and special occupancies. As each group of code subjects was scheduled for discussion, code panels were selected that consisted of members of respective NE code-making panels. In this way, the delegates were able to obtain valuable information concerning the many code problems discussed.

As an added feature during the last code clinic, L. S. Inskip reported on the progress of a joint committee considering appropriate provisions for the use of electrical equipment in and around swimming pools. This joint committee is made up of five members, including the chairmen of code-making panels Nos. 2, 5 and 10. As it stands now, it is possible that the 1962 NEC will include requirements for both line- and low-voltage equipment. For line-voltage equipment, separate, insulated copper conductors are being considered.

Over 300 registrants attended the formal and forum sessions.

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IAEL Delegates Meet In Atlantic City

Nearly 100 delegates and guests of the International Association of Electrical Leagues participated in the 26th annual conference of the Association in Atlantic City, October 4-6. The conference heard a number of electrical industry spokesmen who reviewed and discussed outstanding current league activities in many cities.

John T. Catherwood, Long Island Lighting Co., described the forthcoming 1962 Direct Mail Program of the National Wiring Bureau built on a highly successful program initiated in Chicago.

C. Wesley Meytrott, Consolidated Edison Co., New York, presented a summary of cooperative market development in a major metropolitan area pointing out that highly successful electrical industry promotion can be effective in a city of apartment dwellers.

Louis C. Donaghue, Electrical Maintenance Engineers Association, Philadelphia, Pa., reported on the expanding role of the electrical maintenance engineer and described his organization's educational programs.

Sidney C. Blumenthal, Jr., Blumenthal-Kahn Electric Co., Baltimore, Md., outlined the progress of NECA's sales training program for electrical contractors. NECA has cooperated with the National Wiring Bureau in developing an eight-hour sales workshop which can be sponsored by utilities and leagues, he said.

C. W. Mills, Westinghouse Electric Corp., Pittsburgh, Pa., urged his audience to recognize the vital importance of the "total" electrical approach to marketing. He emphasized the importance of heating and cooling loads to build a bulwark against competition.

EASA News

EASA Directors held their semi-annual board meeting in St. Louis at Clayton Inn on November 17 and 18.

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Wayne A. R. Leys, Dean of Roosevelt University, in Chicago, was the principal speaker at the Chicago Chapter's meeting on November 14 at Petricca's Restaurant.

• • • •

A. Coleman Waldrop, president and treasurer of Wingfield & Hundley, Inc., Richmond, Va.; P. L. Cary, vice president; and Eldridge L. Hicks, secretary, have bought the company from the estate of Irving H. Hundley who died August 4.

• • • •

EASA's exhibit at the forthcoming Plant Maintenance & Engineering Show, January 22-25, 1962, in Philadelphia, will be the tenth consecutive exhibit of the organization at the national exposition. Members of the Quaker City Chapter of EASA are expected to attend the exhibit during the show hours.

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The Stephen Hall & Co., Hoboken, N. J., electrical equipment dealers, is now being operated by Ben, Morris and Irving Hasnas, brothers, who also operate Empire Electric Co., of Brooklyn.

• • • •

Mrs. Alice V. Johnson will continue to operate the Universal Electric Products Co., Detroit, Mich., assisted by her brother, John K. Cleary. The firm had been under the management of the late Charles Johnson, who was also executive secretary of the Great Lakes Chapter of EASA until his death last fall.

• • • •

Monarch Electric & Supply Co. LaSalle, Ill., has moved to a building in Peru, Ill., formerly occupied by Chamberlain Weatherstripping Co. The firm manufactures an electronic control for water plants in addition to servicing equipment.

• • • •

Luther O. Elliot, retired plant superintendent of the Electric Motor & Repair Co., Raleigh, N. C., recently celebrated the 50th anniversary of his career as an active member of the motor repair business. Mr. Elliot, who still spends several hours daily at his office desk despite being "retired," started working November 13, 1911, as a winder for the Armature Winding Co., Charlotte, N. C.

• • • •

Tri-State Chapter met in Pittsburgh, Pa. on November 17.

• • • •

"The service shop business is undergoing a drastic change," says Don Osenbaugh, foreman, J. L. Hughes Electric Co., Columbus, Ohio. He was referring to the need for electrical apparatus service firms to learn to repair industrial electronic controls, as well as motors, generators and transformers.

"If you don't offer your customer this service, you are only giving them reason to go to a competitor who offers a complete repair service," Mr. Osenbaugh stated.

DATES AHEAD

Plant Engineering & Maintenance Show—Convention Hall, Philadelphia, Pa., January 22-25, 1962

Power & Communications Controls Assn.—17th annual convention, Atlanta-Biltmore Hotel, Atlanta, Ga., January 28-30.

American Institute of Electric Engineers—Winter general meeting, Statler-Hilton Hotel and Coliseum, New York, N. Y., January 28-February 2.

Electrical Engineering Exposition—Sponsored by AIEE, New York Coliseum, New York, N. Y., January 29-February 2.

American Society of Heating, Refrigeration & Air Conditioning Engineers Inc.—Semiannual meeting, Chase Park Plaza Hotel, St. Louis, Mo., January 29-February 1; 69th annual meeting, Deauville Hotel, Miami Beach, Fla., June 25-27.

Home Improvement Products Show—Cobo Hall, Detroit, Mich., January 31-February 2.

International Association of Electrical Inspectors — Chapter Meetings — Illinois, Morrison Hotel, Chicago, Ill., February 1-2; **Mississippi**, Heidelberg Hotel, Jackson, Miss., March 5-6; **Ellis Cannady**, Carolina Hotel, Raleigh, N. C., April 10-11; **South Carolina**, Andrew Jackson Hotel, Rock Hill, S. C., April 16-17; **Georgia**, Wanderer Motel, Brunswick, Ga., April 19-20; **Alabama**, Stafford Hotel, Tuscaloosa, Ala., April 23-24; **Five Chapter Joint Meeting**, Captain Shreve Hotel, Shreveport, La., April 26-28; **Tennessee**, April 30-May 1; **Florida**, Jack Tar Harrison Hotel, Clearwater, Fla., May 4-5; **Virginia**, Hotel John Marshall, Richmond, Va., June 18-19; **Southern Section**, Tutwiler Hotel, Birmingham, Ala., October 15-17.

National Industrial Electric Heating Conference—Netherland-Hilton Hotel, Cincinnati, Ohio, February 5-8,

Intermountain Electrical Assn.—Annual conference, Salt Lake City, Utah, February 8.

National Electrical Week—National Promotion, February 11-17.

Air Conditioning, Heating and Refrigeration Industry—12th exposition, Great Western Exhibit Center, Los Angeles, Calif., February 12-15.

Upper Midwest Electrical Industry Convention — Radisson Hotel and Municipal Aud., Minneapolis, Minn., February 18-21.

National Conference on Application of Electrical Insulation—Shoreham Hotel, Washington, D.C., February 19-21.

18th Annual National Wiring Sales Conference—Atlanta-Biltmore Hotel, Atlanta, Ga., February 22-23.

Sacramento Valley Electrical League—Progress in Electrical Equipment Exhibit, Sacramento Inn, Sacramento, Calif., February 28-March 2.

National Rural Electric Cooperative Assn.—20th annual meeting, Convention Hall, Atlantic City, N. J., March 5-8.

Sixth National Electrical Industries Show — New York Coliseum, New York, N. Y., March 11-14.

2nd NEMA National Electric Comfort Heating Exposition and Symposium—Sherman Hotel, Chicago, Ill., March 19-21.

11th Biennial Electrical Industry Show & Lighting Conference—Shrine Exposition Hall, Los Angeles, Calif., March 28-31.

Edison Electric Institute—Sales conference, Edgewater Beach Hotel, Chicago, Ill., April 2-4.

Electrical Association of New Orleans Southern Electrical Exposition—Municipal Auditorium, New Orleans, La., April 2-4.

Southern West Virginia Home Show—Civic Center, Charleston, W. Va., April 4-8.

Rocky Mountain Electrical League—Spring conference, Harvest House, Boulder, Colo., April 15-17; Fall convention, The Broadmoor, Colorado Springs, Colorado, October 14-18.

National Association of Electrical Distributors—Convention, Pittsburgh, Pa., May 12-16.

Pacific Coast Electrical Assn.—Annual convention, Ambassador Hotel, Los Angeles, Calif., May 16-18.

National Fire Protection Association—66th annual meeting, Sheraton Hotel, Philadelphia, Pa., May 21-25.

Edison Electric Institute—Annual convention, Atlantic City, N. J., June 4-6.

Electrical Apparatus Service Association—Convention, Conrad-Hilton Hotel, Chicago, Ill., June 10-13.

Los Angeles Home Show—Memorial Sports Arena, Los Angeles, Calif., June 21-July 1.

N. Y. State Assn. of Electrical Contractors & Dealers—Annual convention, Whiteface Inn, Lake Placid, N. Y., July 2-7.

Western Electronic Show & Convention — Memorial Sports Arena, Los Angeles, Calif., August 21-24.

American Home Lighting Fixture Month—National promotion, September 1-30.

Illuminating Engineering Society—National technical conference, Statler-Hilton Hotel, Dallas, Texas, September 9-14.

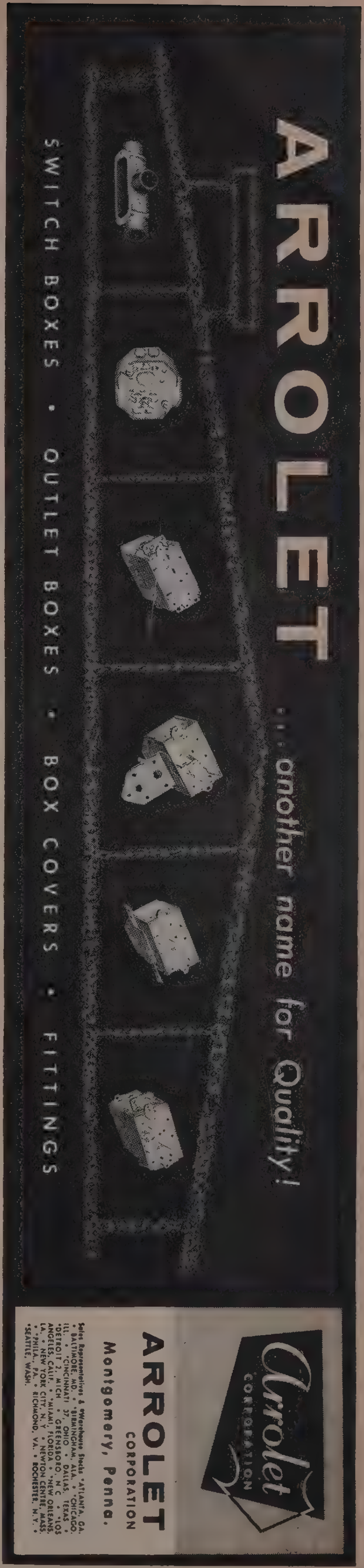
Canadian Electrical Mfrs. Assn.—Annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont., October 3-5.

International Assn. of Electrical Leagues—27th annual conference, Sheraton-Chicago, Chicago, Ill., October 3-5.

National Electrical Contractors Assn.—Minneapolis Auditorium, Minneapolis, Minn., October 7-13.

National Electronics Conference—McCormick Place, Chicago, Ill., October 8-10.

National Electrical Manufacturers Assn.—Annual meeting, Shoreham Hotel, Washington, D. C., week of November 12.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Leach Corp., Compton, Calif.—Joseph S. Pares, general sales manager.

Emerson Electric Mfg. Co., St. Louis, Mo.—Robert D. MacCloy, advertising manager; Bruce Ross, sales manager of electric heat.

Unistrut Products Co., Chicago, Ill.—David C. Norris, manager of electrical sales.

General Bearing Co., Inc., West Nyack, N. Y.—William E. Horenburger, national sales manager.

Black & Decker Mfg. Co., Towson, Md.—Frederick A. Alden, purchasing manager.

Gill Glass & Fixture Co., Philadelphia, Pa. — Charles Lehrman, director of sales.

Kohler Co., Kohler, Wis.—J. L. Luplic, production manager.

Anderson Electric Corp., Leeds, Ala.—Edwin F. Classen, sales vice president.

Leeds & Northrup Co., Philadelphia, Pa.—Alfred E. Tarr, board of directors.

Electrical Fittings Corp., East Farmingdale, N. Y.—Bob Prussia, national sales manager.

Silvray Lighting, Inc., Bound Brook, N. J.—Robert L. Levenstein, executive vice president.

Sylvania Electric Products Inc., Salem, Mass. — E. Barry Colby, marketing manager, industrial-commercial sales, Lighting Products Div.

Thomas Industries Inc., Louisville, Ky.—Frederic B. Osler, Jr., director of industrial relations.

Controls Co. of America, Chicago, Ill.—James H. Douglas, Jr., director.

Youngstown Sheet & Tube Co., Youngstown, Ohio—Robert E. Williams, vice president of sales.

Halo Lighting Products, Inc., Chicago, Ill. — Jim Wolfson, national sales manager, Architectural Lighting Div.; Mike Gerber vice president of national sales; Dan Thomson, executive vice president.

Crescent Engineering Co., Chicago, Ill.—William M. Spain, vice president.

Lehrolite, Inc., Wallingford, Conn.—Paul B. Yasmer, national sales manager; Marc Packer, factory manager.

Litecraft Industries, Ltd., Passaic, N. J.—Gerald E. Morris, executive vice president and treasurer.

Pringle Electrical & Mfg. Co., Philadelphia, Pa. — Robert E. Brown, manager, application engineering.

International Resistance Co., Philadelphia, Pa.—John H. Dummer, vice president; Otto C. Kebernick, director of marketing.

Dayco Corp., Dayton, Ohio—Thomas E. Farrell, marketing manager, Rubber Products Div.

J. I. Case Co., Racine, Wis.—Morris W. Reid, vice president of marketing.

Oak Mfg. Co., Crystal Lake, Ill. —R. W. Peirce, manager, new products.

Motorola Communications & Electronics, Inc., Chicago, Ill.—Robert L. Borchardt, national service manager.

Ideal Electric & Mfg. Co., Mansfield, Ohio—Charles C. Libby, marketing manager.

Fasco Industries, Inc., Rochester, N. Y.—Peter L. Quattrochi, vice president of sales.

Regional Appointments

MIDDLE ATLANTIC

Allis-Chalmers Mfg. Co.: Peter F. Lovato, manager, product sales for power, instrument and control transformers at Pittsburgh Works.

National Supply Div., Armco Steel Corp.: Herman O. Gerdts, representative in New York City for Spang conduit.

Wheelock Signals, Inc.: Peter F. Graham, Eastern regional sales manager.

General Electric Co.: Robert A. Mehaffey, manager of Allegheny sales district, headquartered in Pittsburgh; Large Lamp Dept.

Continental Electric Equipment Co.: Peter Schurman, Englewood, N. J., sales representative for New York City area.

SOUTH ATLANTIC

Owatonna Tool Co.: William T. McCorkle, district manager for Florida; Martin M. Shea, district manager for District of Columbia, Virginia, Maryland and Delaware; Tools & Equipment Div.

Progress Mfg. Co.: Elliot Fox, senior sales representative in Virginia excluding Fairfax County, and part of North Carolina, with headquarters in Richmond; Martin J. Lampe, senior sales representative in part of Georgia, all of Alabama, a portion of Florida and the city of Aiken, South Carolina, with headquarters in Atlanta.

Westinghouse Electric Corp.: Raymond S. Stumpf, Richmond district sales manager, Lamp Div.

Electric Storage Battery Co.: Charles A. Taylor, manager of southeast region, Exide Industrial Marketing Div.

Continental Electric Equipment Co.: L. A. Poirier, sales representative for Georgia.

EAST CENTRAL

General Electric Co.: Michael C. Finn, manager of Michigan sales district with headquarters in Detroit; Large Lamp Dept.

Black & Decker Mfg. Co.: Robert C. Sieja, sales representative in Chicago district; A. Y. Hoff, sales representative in Cleveland district; Consumer Products Div.

H. K. Porter Co., Inc.: M. P. Murzyn, Chicago branch manager; National Electric Div.

Guardian Light Co.: James T. Monroe, Chicago marketing manager.

Feedrail Corp.: C. J. Roderick Co.: L. A. Poirer, Atlanta, sales representative for Georgia.

Allis-Chalmers Mfg. Co.: R. E. Goodwill, sales manager, Norwood (Ohio) Works electrical department.

WEST CENTRAL

General Electric Co.: L. R. Anderson, manager of Northern Sales district headquartered in Minneapolis, Minn.; Large Lamp Dept.

Paine Co.: George M. Wassa, Rainbow Electrical Sales Agency, San Antonio, representative in Texas; Jim Laubersheimer & Associates, New Orleans, representative in Louisiana.

Wadsworth Electric Mfg. Co., Inc.: W. Neil Keddie, district sales manager located at Dallas, Texas.

Owatonna Tool Co.: Otto L. Hughes, Jr., district manager for Louisiana and northeastern Texas; Tools & Equipment Div.

WEST

Progress Webster Corp.: Dave Miller Sales Co., Seattle, Wash., Northwest sales representative.

Wheelock Signals, Inc.: McKnight Co., Menlo Park, Calif., sales representative.

Kirlin Co.: W. K. Turner, Seattle, representative in Seattle-Tacoma area.

Electrical Fittings Corp.: Charles Lawler, manager of Los Angeles branch office.

Allis-Chalmers Mfg. Co.: J. F. Fenske, manager, motor sales, Pacific region, headquartered in San Francisco.

ELECTRIC HEAT FOR MIDWEST MOTEL

[FROM PAGE 82]

cate vacancies. However, the switch toggles must be in the "up" position to hold the keys. Switches reset in this manner return the rooms they control to "Lo" or "set-back" condition.

The stainless steel panel in the motel office is 42 in. high and 48 in. wide; contains 120 toggle switches in six horizontal rows, has space for future additions. It is hinged on one side to provide access to switch terminals. Each switch is numbered to identify the room it controls. Each horizontal row has a "Lo" and "Hi" position indicator as a gentle reminder of the set-back control system.

Operation of the set-back control is basically simple. Each room heater is equipped with a 24-volt relay actuated by the toggle switch in the office panel. When the switch is in the "Lo" or "up" position, this relay is de-energized closing the circuit to the 55° constant thermostat built in the heater and opening the circuit to the room thermostat (see circuit diagram). When the switch is in the "Hi" or "down" position, the relay is energized and disconnects the heater thermostat while placing the room thermostat in the heater control circuit.

When the room transfer switch is in the "cool" position (for summer operation) the set-back control works like this. When the office switch is in the "up" position (key on, indicating vacancy) the de-energized relay opens the circuit to the room thermostat and the air conditioner is shut off. When the switch is in the "down" position (no key, indicating occupancy) the energized relay closes the cooling circuit of the room thermostat and the air conditioner operates.

Motel management is well pleased with the electric heating-cooling installation and particularly likes the simplicity, convenience and economy afforded by engineer Drucker's finger-tip set-back control. With control keyed to guest arrival and departure, both agree that the possibility of forgetting to "set-back" vacant units is quite remote. Since responsibility is centered in the person at the desk, rather than spread among several service employees, chances of continuous heating or cooling of unrented rooms are slim.

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Advertising In This Issue

Abolite Lighting Div., The Jones Metal Products Co. 28
Adam Electric Co., Frank............ 23
Advance Transformer Co............ 19
Allen-Bradley Co. 129, 130
• Allis-Chalmers Mfg. Co..........33, 34
American Sealants Co.............. 122
• American Steel & Wire Div. of U. S. Steel 20, 21
• American Metal Hose Div., Anaconda American Brass Co............... 110
Anaconda Wire & Cable.........66, 150
Appleton Electric 2
• Arrolet Corp. 159

Bethlehem Steel Co................ 155
• Blackhawk Industries 132
• Briegel Method Tool Co............ 52
BullDog Electric Products Division I-T-E Circuit Breaker Co.......78, 115

Champion DeArment Tool Co....... 123
Champion Lamp Works..........12, 13
Circle Wire & Cable A Subsidiary of Cerro Corp. 153
Clipper Mfg. Co.................... 30
Collyer Insulated Wire Co.......... 26
Conduit Nipple Mfg. Co........... 140
• Crouse-Hinds Co. ....Fourth Cover
• Cutler-Hammer Inc. 16, 17

• Dongan Electric Mfg. Co........... 131
Dow Corning Corp................. 4
duPont de Nemours & Co., Inc., E. I. 56

Eagle Electric Mfg. Co., Inc......... 148
Economy Fuse Div., Federal Pacific Electric Co. 119
• Efficiency Electric & Mfg. Co....... 134
Electrical Construction & Maintenance 72, 73
Electrical Tubular Products, Inc....... 156
Electri-Flex Co. 126
Exide Industrial Marketing Div. of The Electric Storage Battery Co........ 32

• Federal Pacific Electric Co.......... 29
• Furnas Electric Co.................. 118

G & W Electric Specialty Co........ 120
Gamewell Co. 67
General Electric Co.............39, 57
Silicone Products Dept........... 60
• Graybar Electric Co., Inc........... 6
Guth Co., The Edwin F.....Second Cover

Heinemann Electric Co.............. 109
Helwig Carbon Products, Inc........ 134
Hevi-Duty Electric Co..........124, 125
• Hose-McCann Telephone Co., Inc.... 160
• Hubbell Inc., Harvey............... 121

Ilsco Corp. 70

Jet Line Products Inc...........134, 140
Johns-Manville, Dutch Brand Div..... 147
Jones Metal Products Co., The...... 28

Kalamazoo Tank & Silo Co.......... 160

Leviton Mfg. Co., Inc.............. 61
Lidseen of North Carolina, Inc....... 108
Line Material Industries..........10, 11
Longyear Co., E. J................. 120

McGraw-Hill Book Co.............. 158
McGraw-Hill Publishing Co......... 58
• Minerallac Electric Co.............. 146
Minneapolis Honeywell Regulator Co. 64, 65, 76
Multi Electric Mfg. Inc.............. 132
Murray Mfg. Corp.................. 31

National Supply Div., Armco Steel Corp. 53
National Tube Div. of U. S. Steel.... 74
Norton Door Closer Co., Div. of Yale & Towne Mfg. Co............... 103

• Paine Co., The..................... 141
Paranite Wire & Cable Div., Essex Wire Corp. 71
Pass & Seymour, Inc............... 35
Penn-Union Electric Corp........... 75
Permacel 136
• Phelps Dodge Copper Products Corp. 40, 41
• PLM Products Inc.................. 106
Plymouth Rubber Co., Inc.......... 27
Porcelain Products Co.............. 122

Ramset Fastening System........... 38
Republic Steel Corp.............68, 69
Ridge Tool Co., The............... 127
Rockbestos Wire & Cable Co., Div. of Cerro Corp. 138, 139
• Rome Cable Div. of Alcoa....14, 15, 157
Royal Electric Corp................ 135

• S & C Electric Co..............116, 117
• Sierra Electric Corp................ 114
Simplex Wire & Cable Co........... 18
Skil Corp. 107
Sola Electric Co., Div. of Basic Products Corp. 104
• Sorgel Electric Co...............54, 55
Square D Co........Third Cover, 1, 8
Stampings Inc. 126
• Steel City Electric Co............... 59
Steel & Tubes Div...............68, 69
Sylvania Electric Products, Inc. 24, 25, 42

• Thiel Tool & Engineering Co., Inc... 140

Union Carbide Plastics Co., Div. of Carbide Corp. 22
• U. S. Steel..................20, 21, 74

Volkswagen of America, Inc.......... 149

Wagner Electric Corp..........133, 142
Western Insulated Wire Co......... 128
Westinghouse Electric Corp.......62, 63
Pittsburgh 48, 49, 50, 51
Lamp Div. 144, 145
Wide-Lite Corp. 47
• Wiremold Co. 43, 44, 45, 46

Youngstown Sheet & Tube Co., The 36, 37

■

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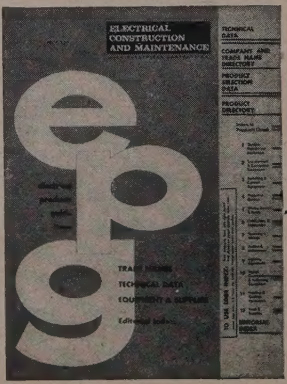

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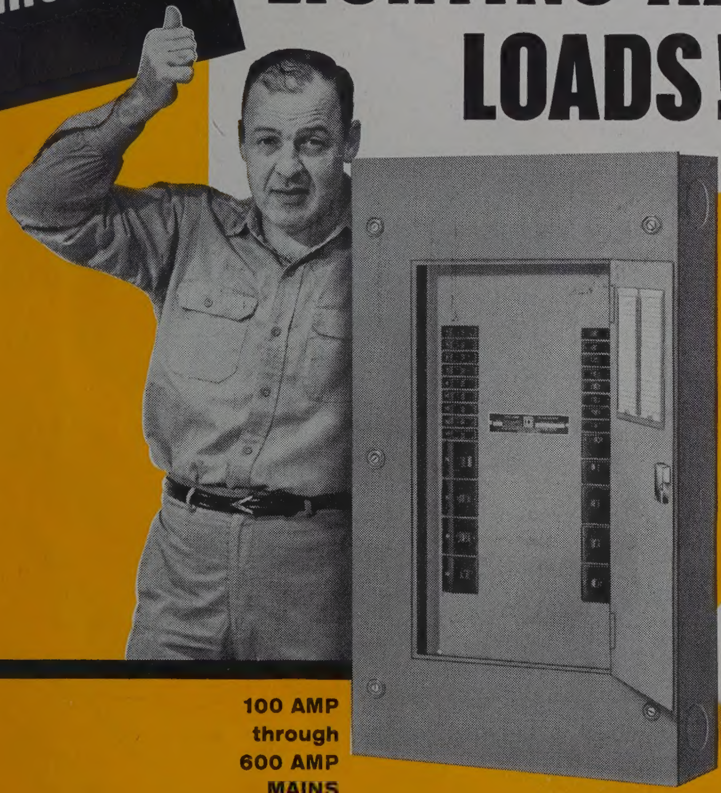

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